

# KIC 008943248

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008943248-01	OBS	No	367.346771	176.988189	577.9	19.883	8.1	8.0	1.50	5322	5.26	1.70
008943248-02	OBS	No	544.013120	193.422045	544.0	16.349	7.3	7.1	1.50	5322	3.73	1.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008943248-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—ALL_TRANS_CHASES—CENT_FEW_DIFFS
008943248-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—ALL_TRANS_CHASES—CENT_FEW_DIFFS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

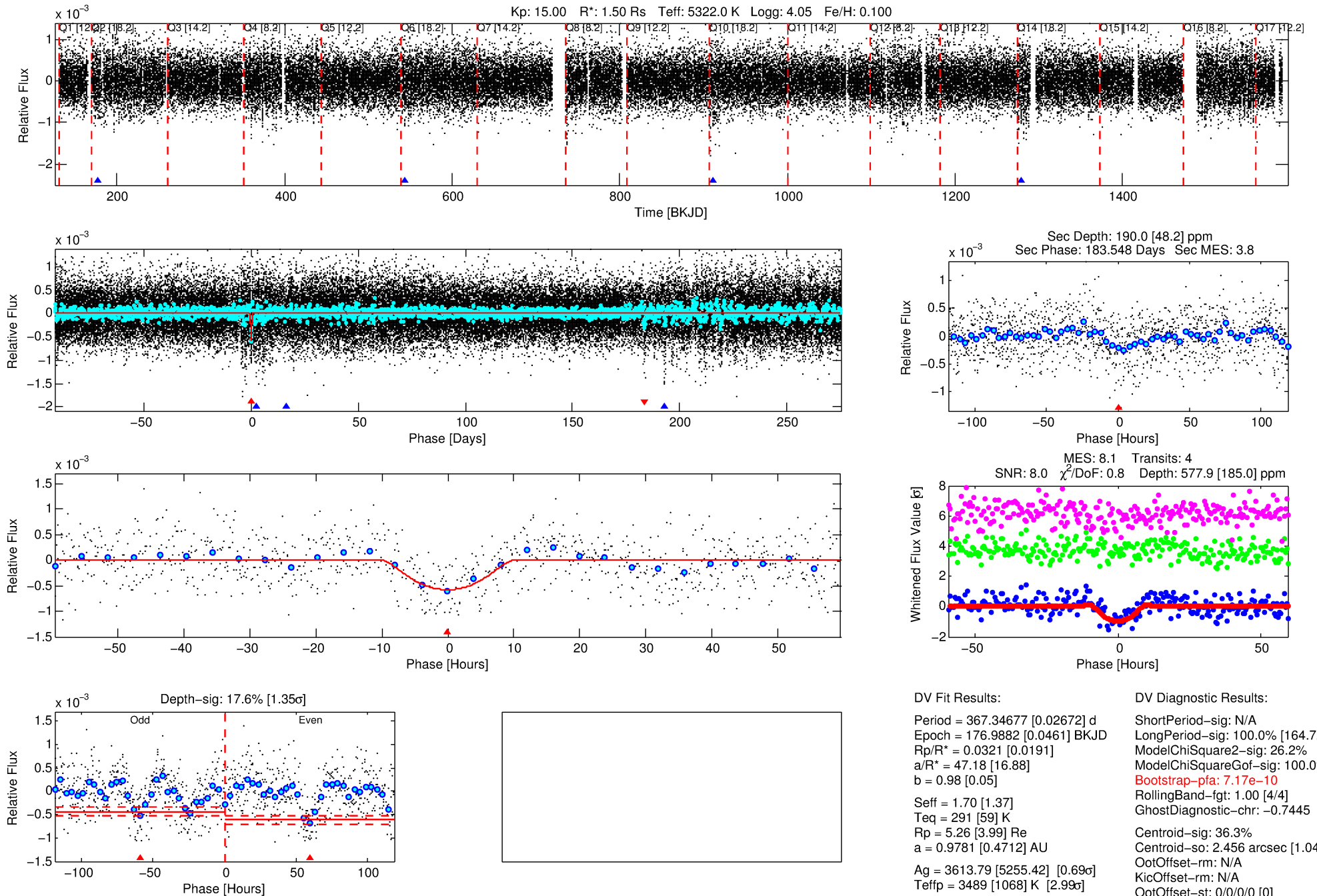
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008943248-01

No Significant Match Found

# DV One-Page Summary

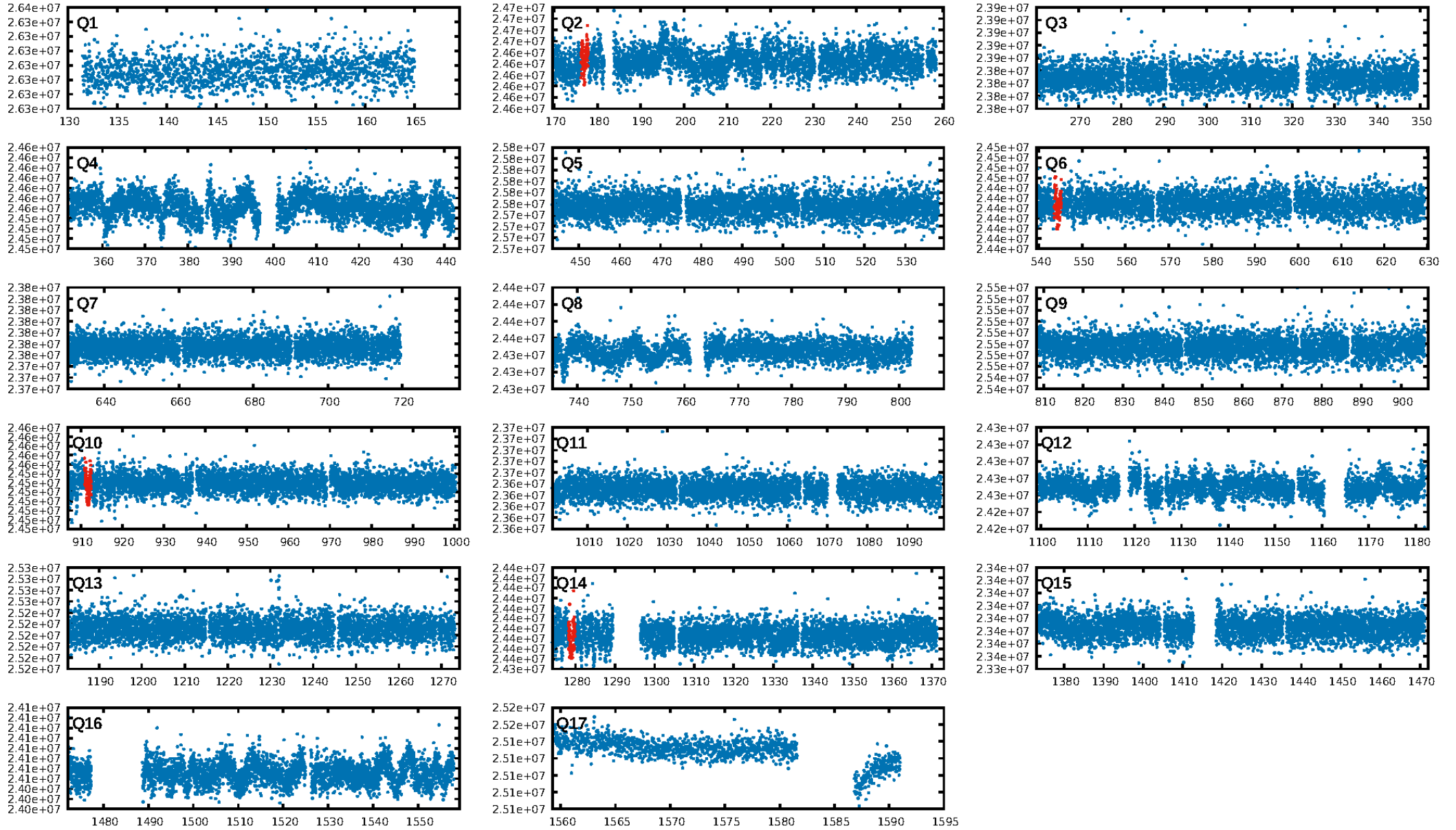
KIC: 8943248 Candidate: 1 of 2 Period: 367.347 d



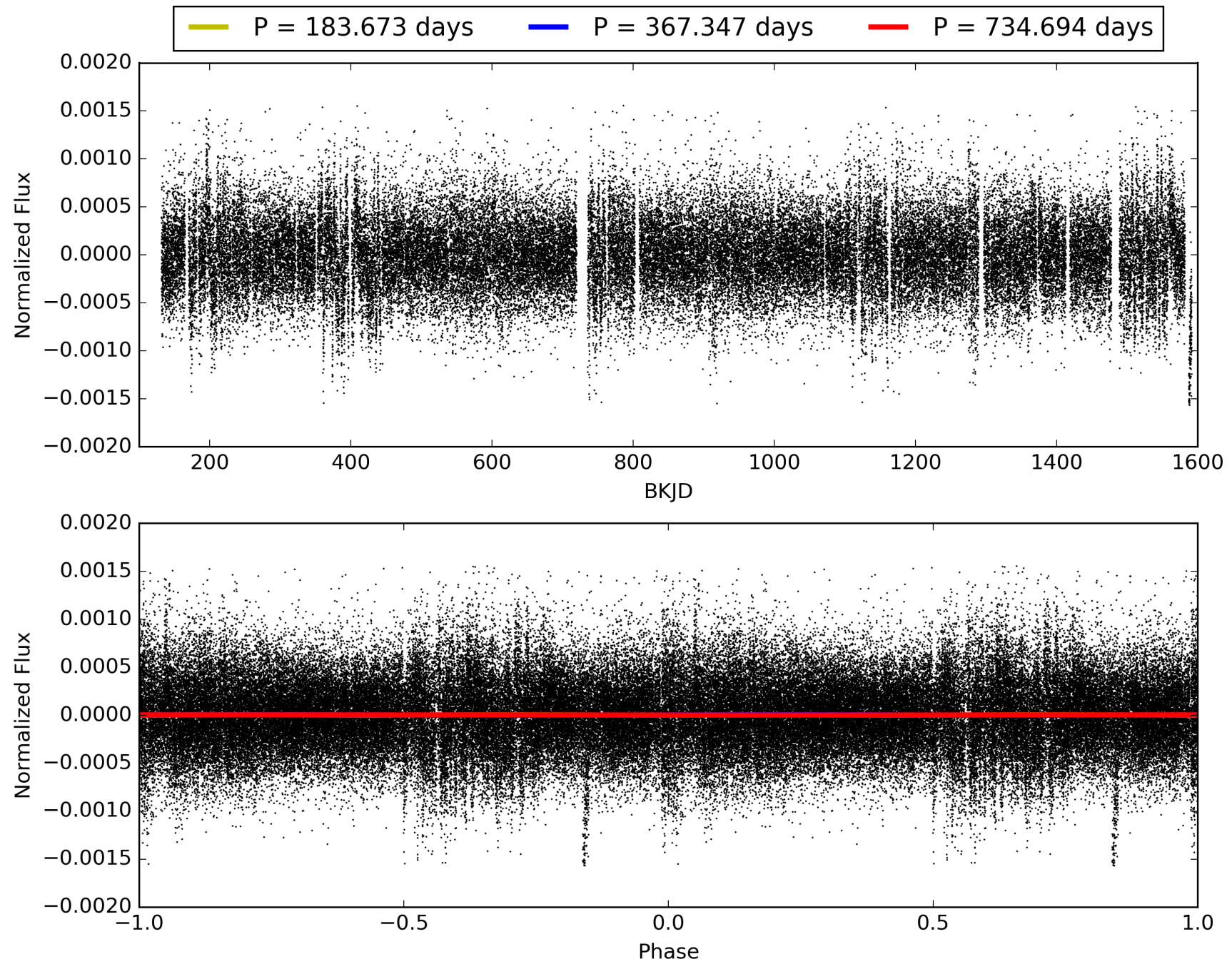
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 02:19:45 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008943248-01, PDC Light Curves

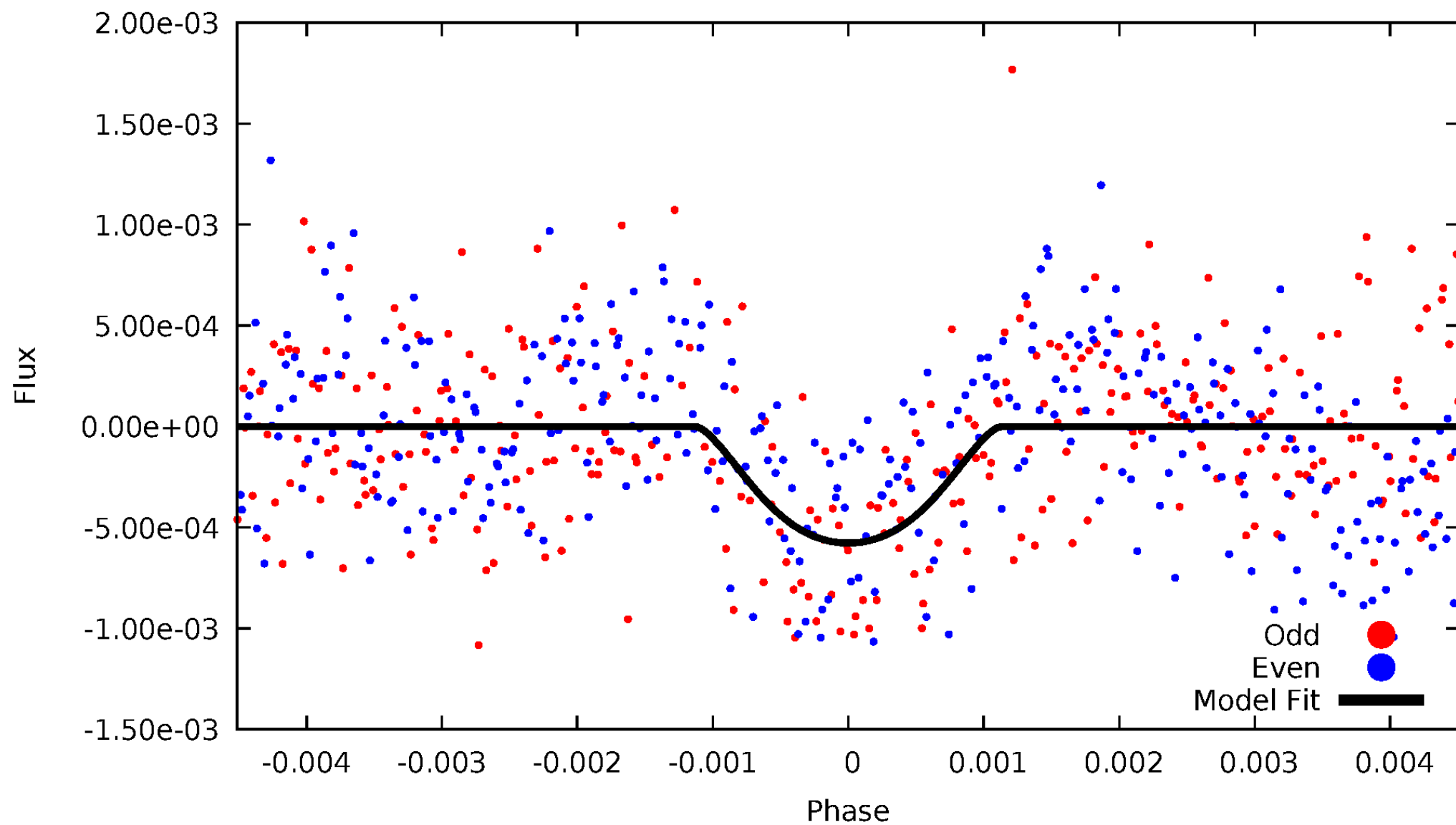


TCE 008943248-01



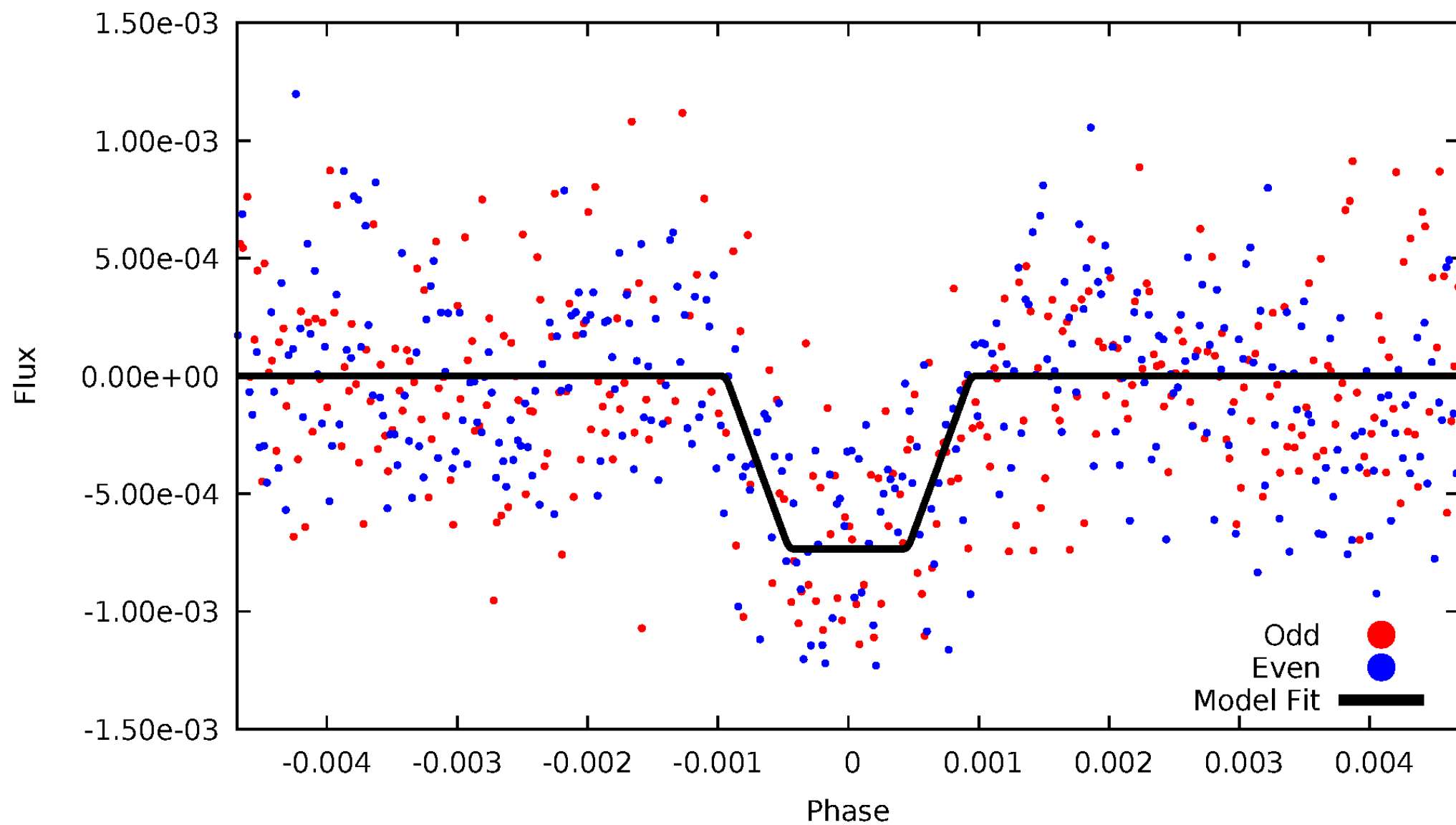
# DV Odd/Even

TCE 008943248-01



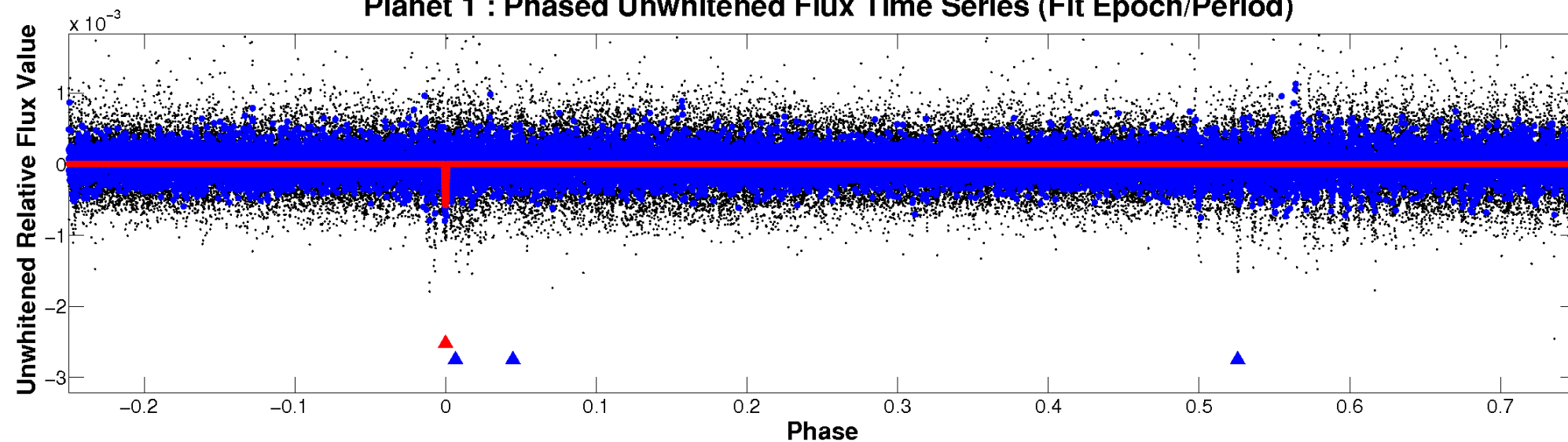
# ALT Odd/Even

TCE 008943248-01

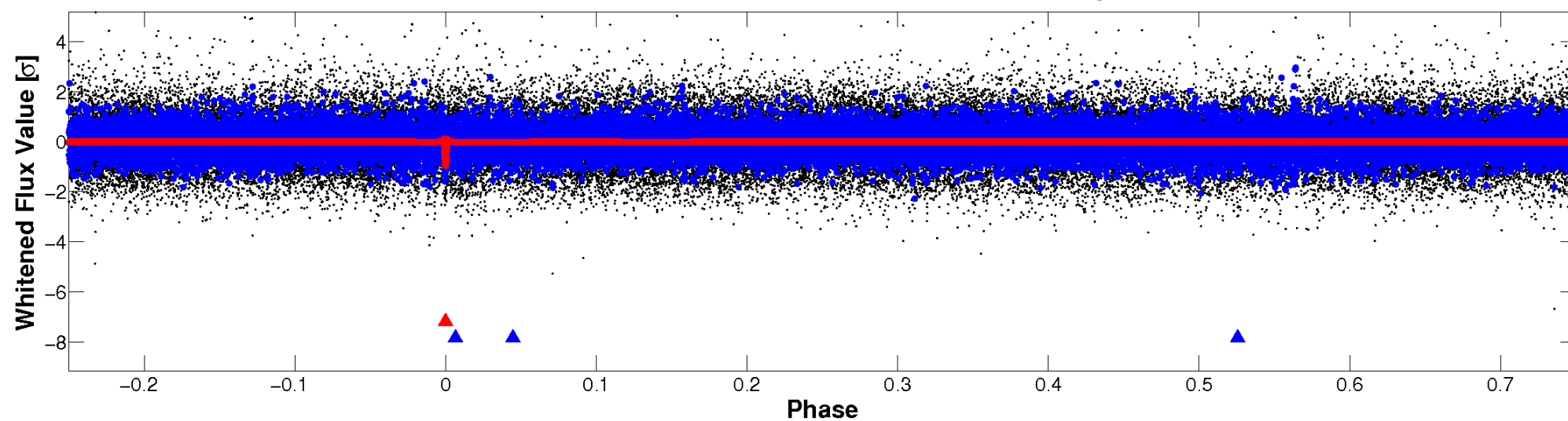


# Non-Whitened Vs. Whitened Light Curve

Planet 1 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

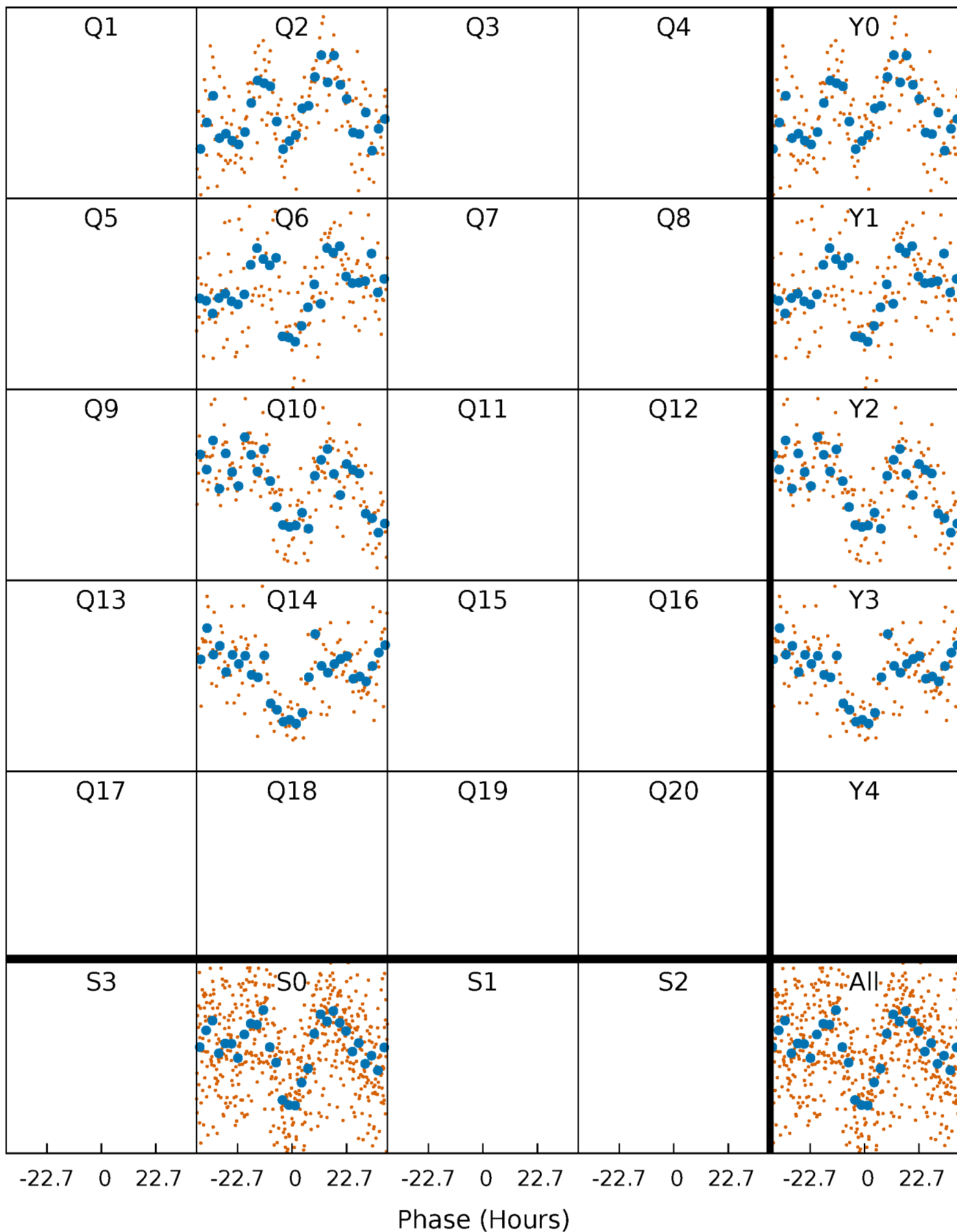


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



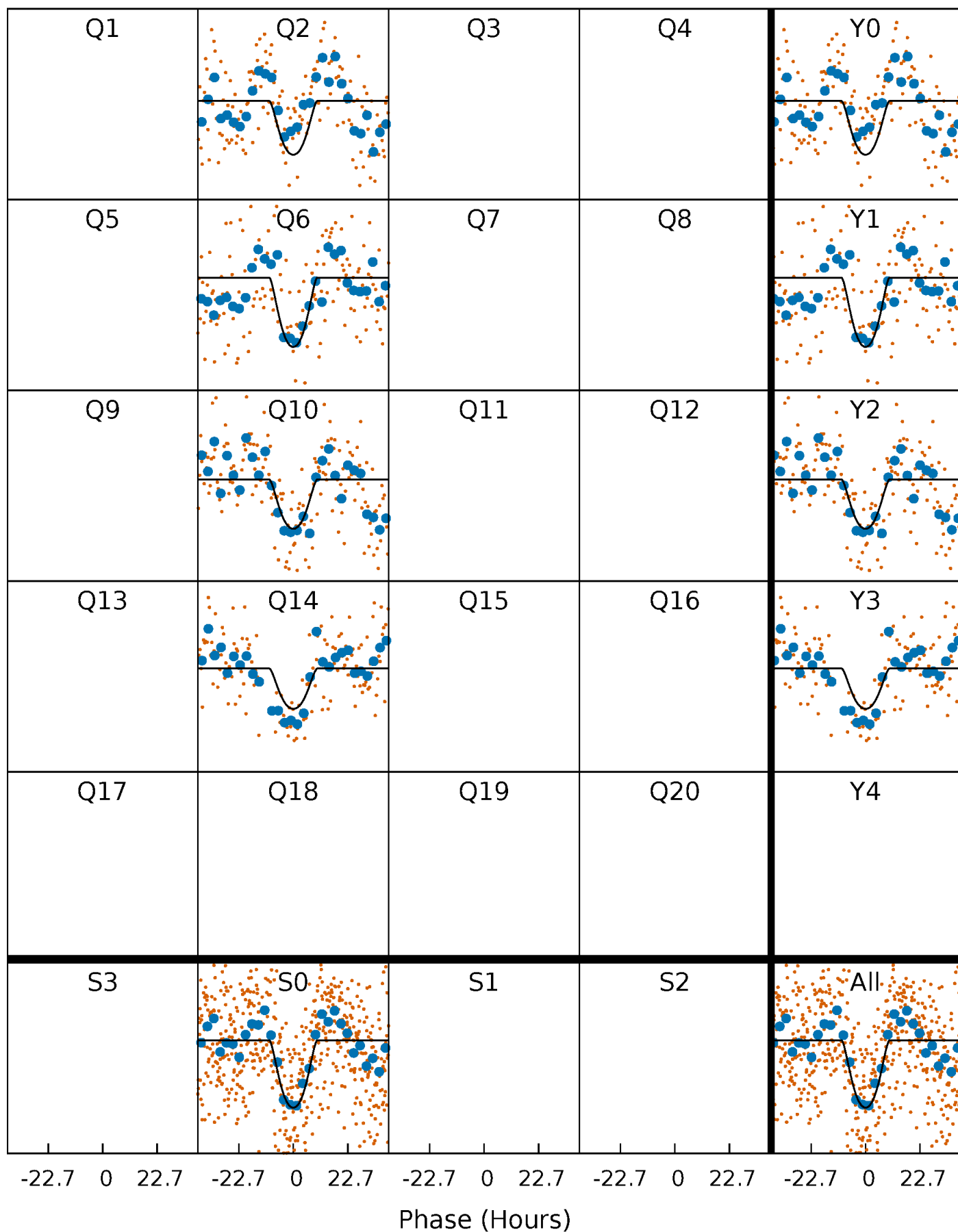
# PDC Quarter-Phased Transit Curves

TCE 008943248-01 P=367.346771 Days  $T_0=176.988189$  (BKJD)



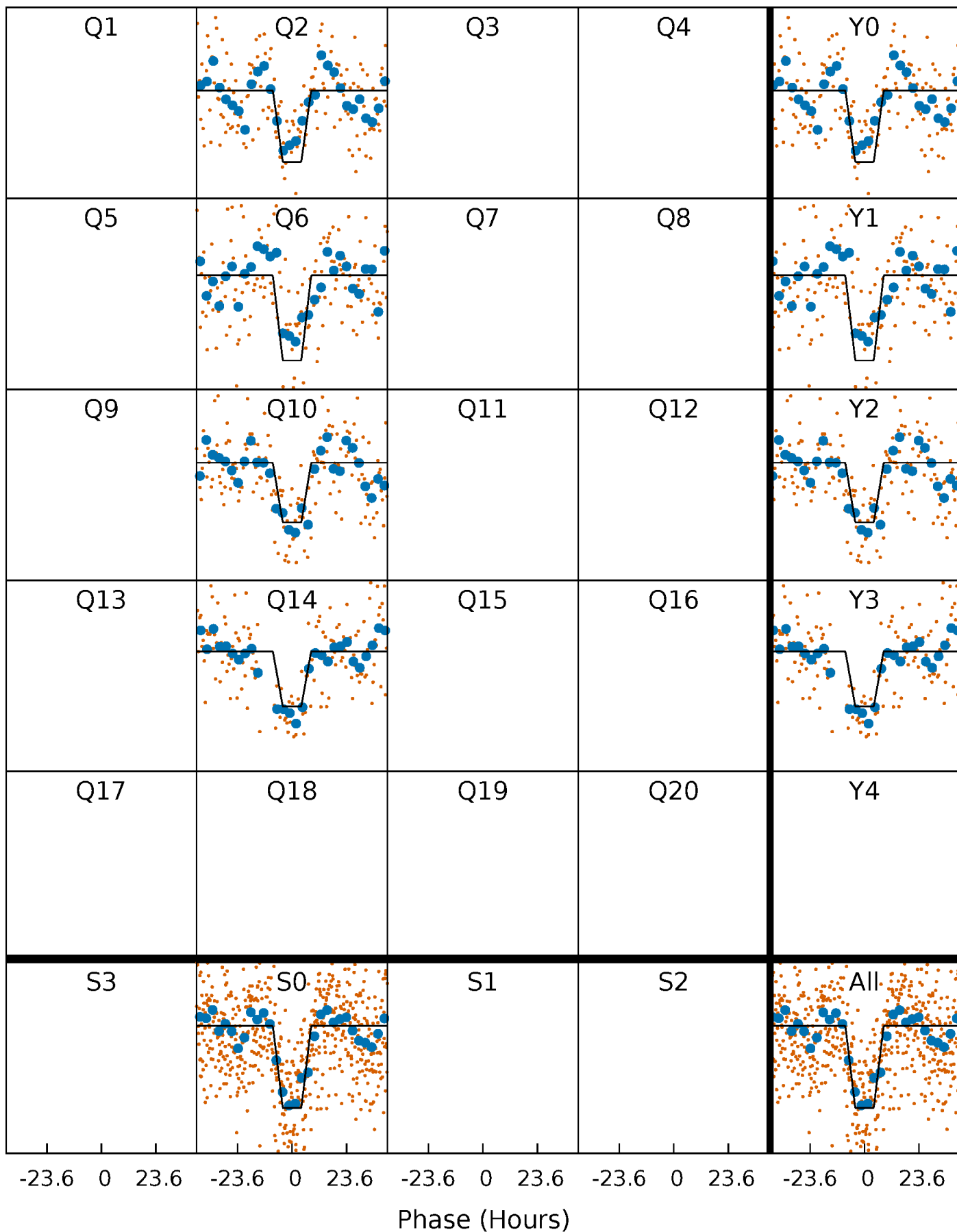
# DV Quarter-Phased Transit Curves

TCE 008943248-01 P=367.346771 Days  $T_0=176.988189$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

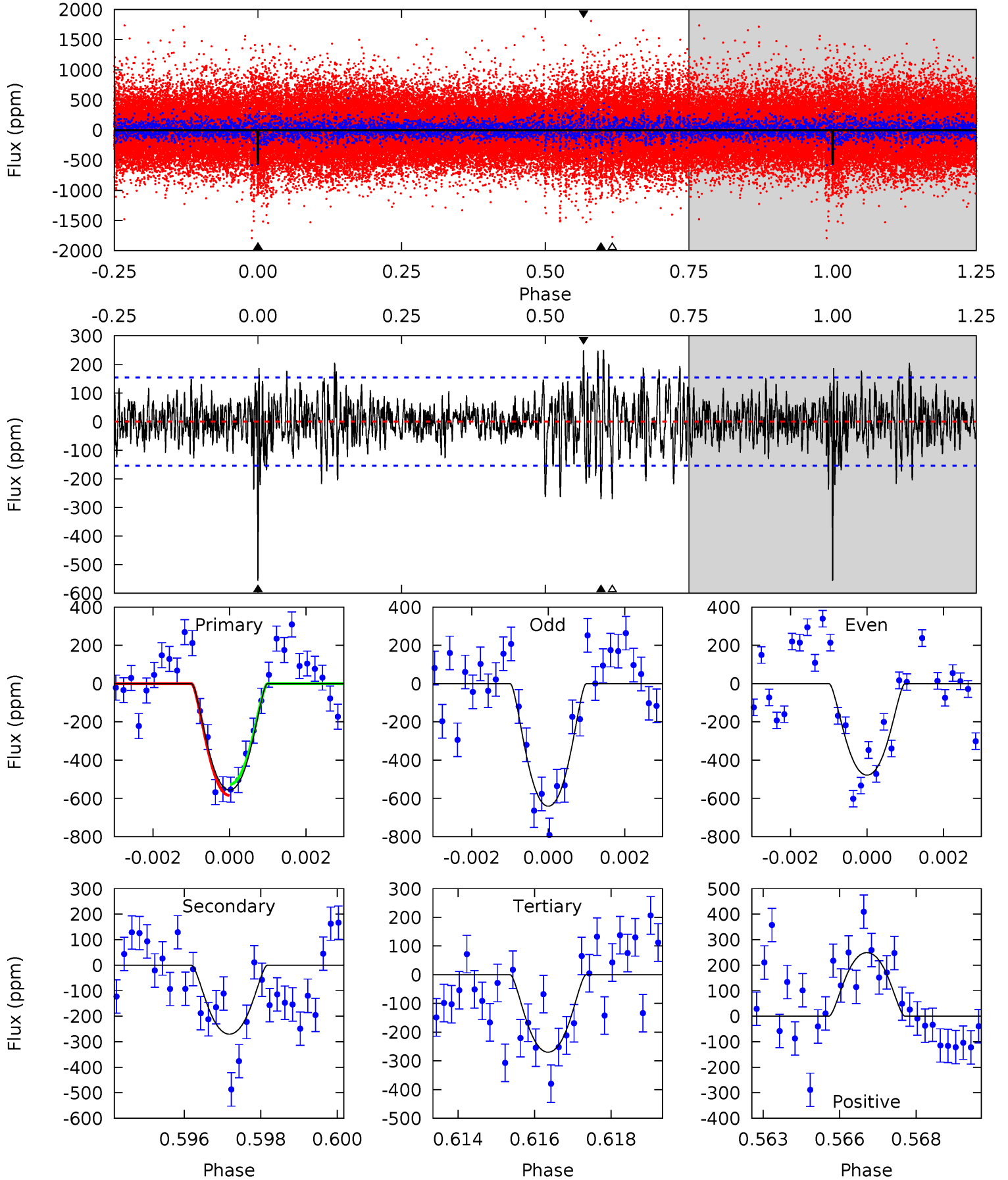
TCE 008943248-01 P=367.340919 Days  $T_0=176.990018$  (BKJD)



# DV Model-Shift Uniqueness Test

008943248-01, P = 367.346771 Days, E = 176.988189 Days

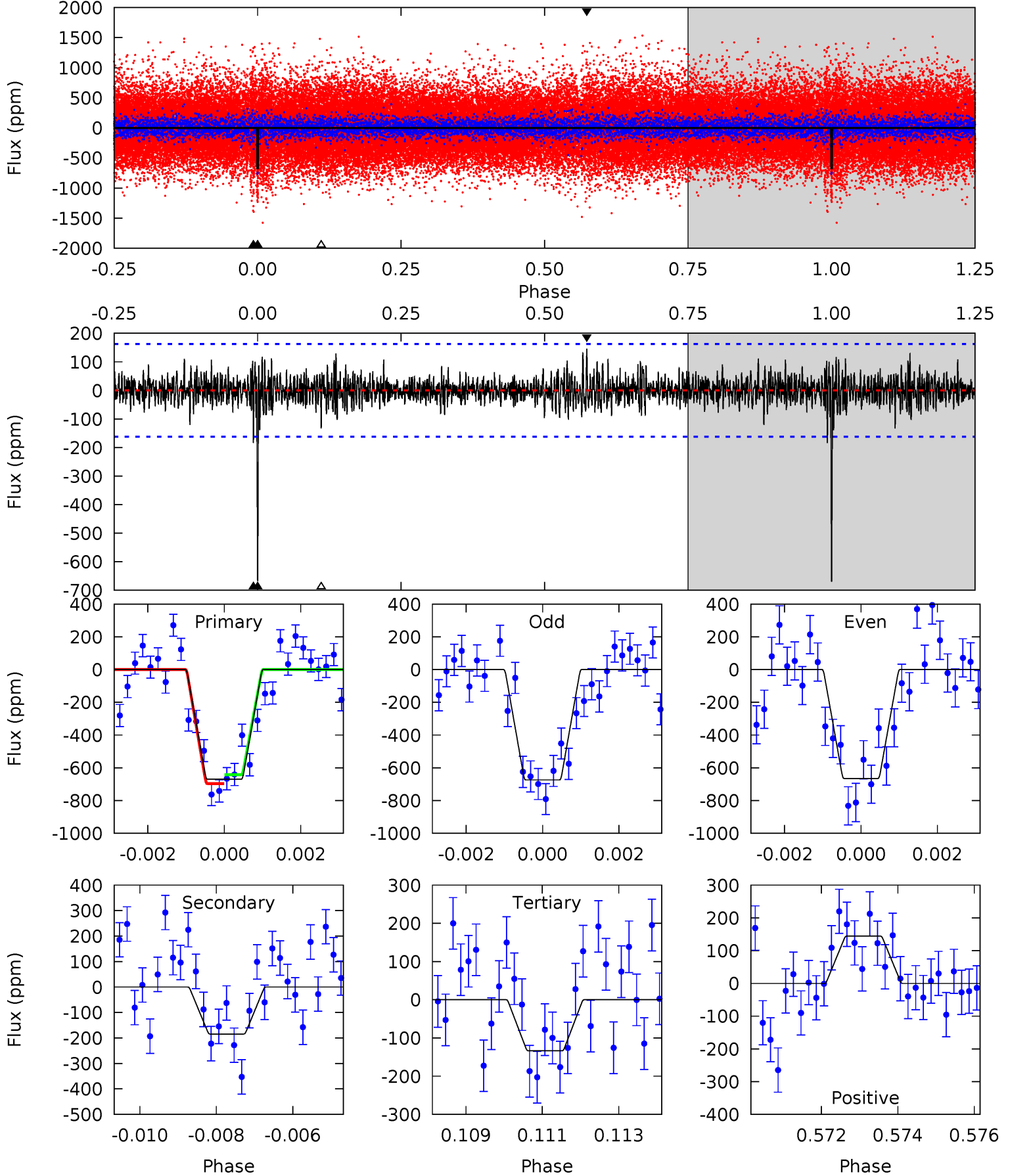
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.2	9.31	9.29	8.59	5.30	3.05	2.30	9.87	10.6	0.02	0.72	2.80	0.96	0.31	0.99



# Alt Model-Shift Uniqueness Test

008943248-01, P = 367.340919 Days, E = 176.990018 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22.0	6.06	4.39	4.74	5.34	3.10	1.14	17.6	17.3	1.67	1.32	0.15	1.02	0.18	0.90



### Stellar Parameters For KIC 008943248

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5322^{+175}_{-159}$	$4.050^{+0.476}_{-0.204}$	$0.100^{+0.250}_{-0.250}$	$1.503^{+0.531}_{-0.708}$	$0.923^{+0.073}_{-0.100}$	$0.383^{+1.594}_{-0.210}$
	+3%/-3%	+12%/-5%	+250%/-250%	+35%/-47%	+8%/-11%	+416%/-55%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 008943248-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-270 \pm 29$	$4.98^{+3.35}_{-2.74}$	$400^{+43}_{-52}$	$4010^{+1530}_{-538}$	$5586^{+22631}_{-3597}$
Alt.	$-184 \pm 30$	$4.27^{+3.40}_{-2.45}$	$402^{+39}_{-52}$	$3932^{+1753}_{-574}$	$5065^{+23933}_{-3443}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

## DV Centroid Data

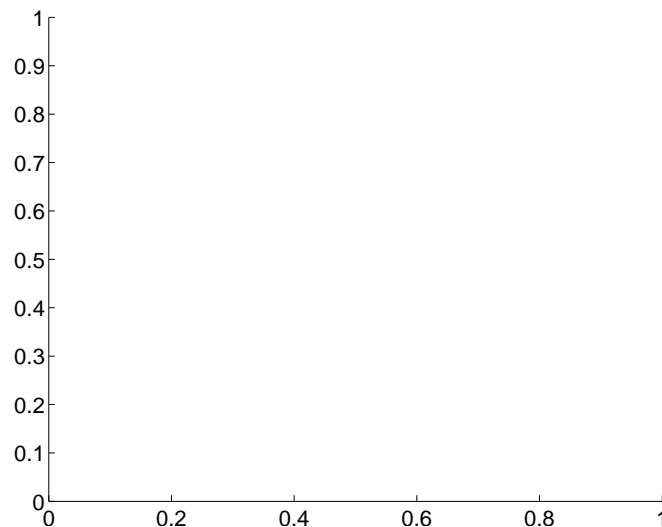
Supplemental centroid analysis for 008943248-01. Kepler magnitude: 15.00. Transit SNR 7.95

There are 0 quarters with good PRF difference image offsets

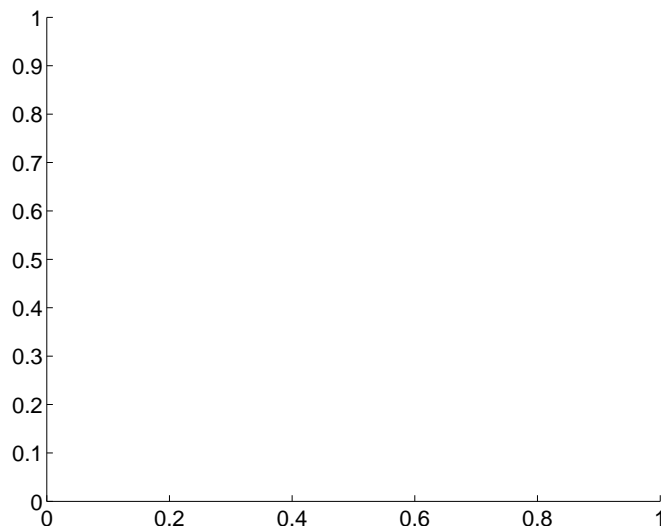
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$2.46 \pm 2.35$	1.04	$2.38 \pm 2.38$	$-0.61 \pm 1.86$

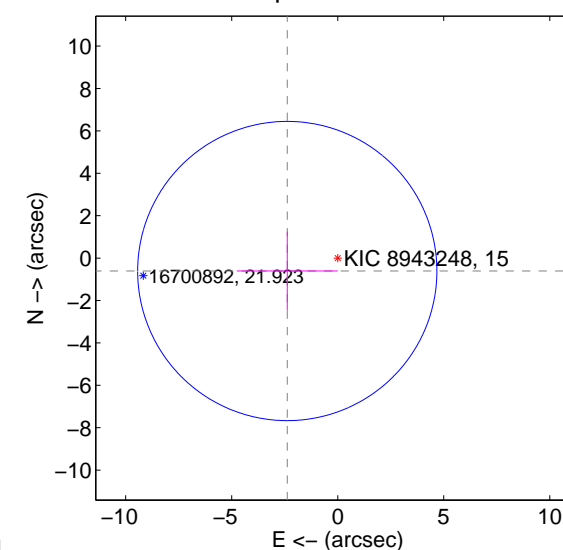
There is no PRF-fit offset from OOT-fit



There is no PRF-fit offset from KIC



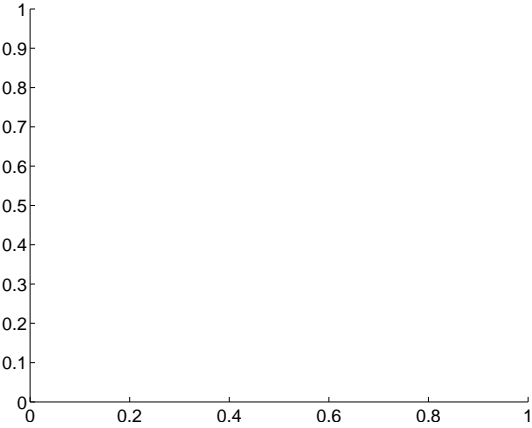
offset from photometric centroids



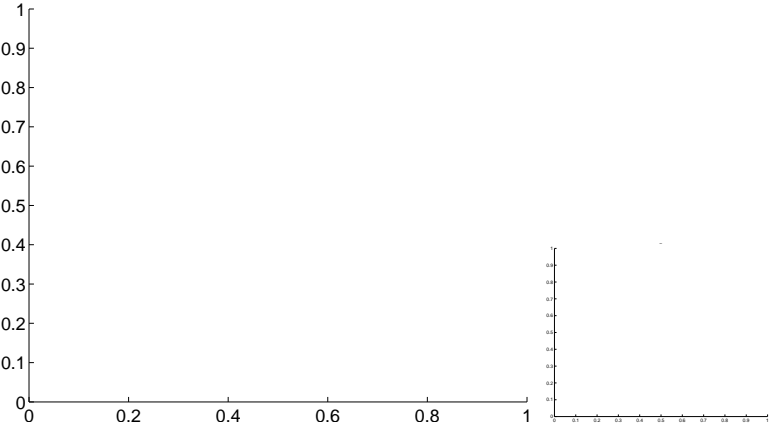
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

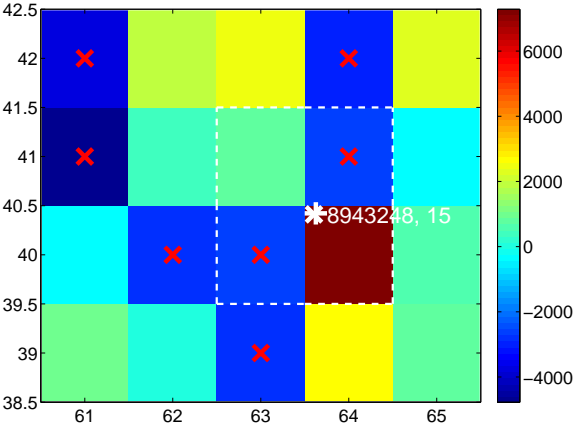
Q1 no difference image



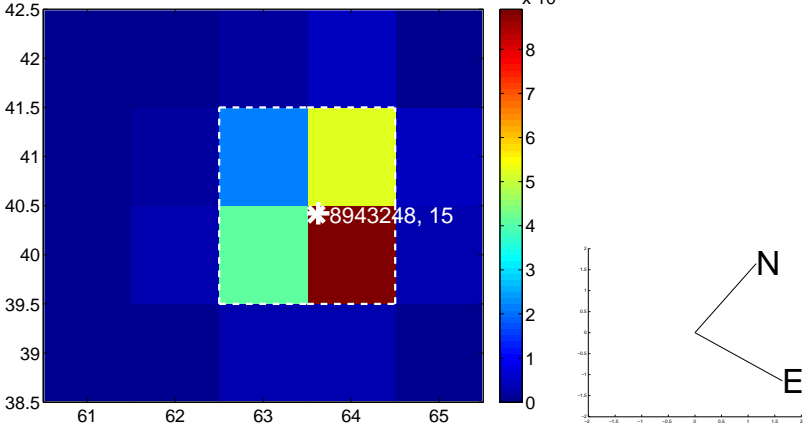
Q1 no OOT image



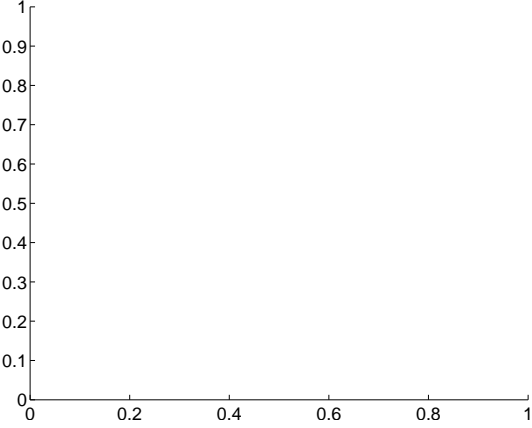
Q2 difference image. Poor Quality



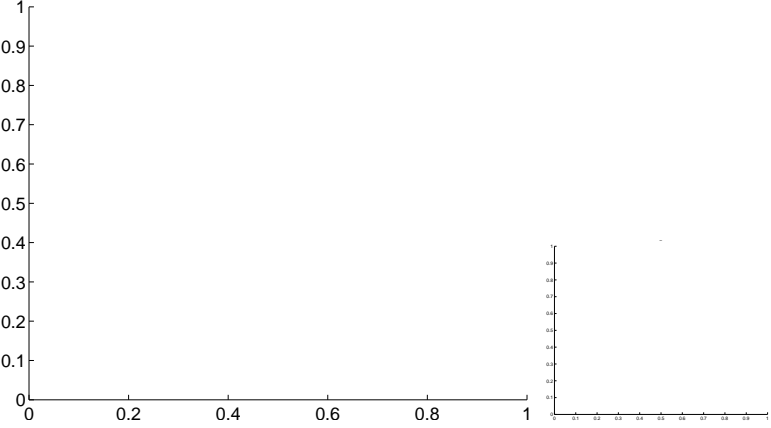
Q2 OOT image



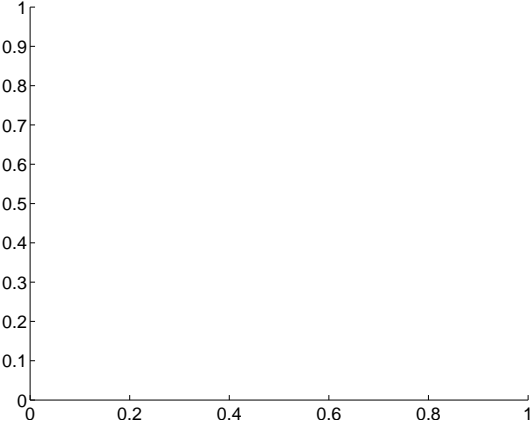
Q3 no difference image



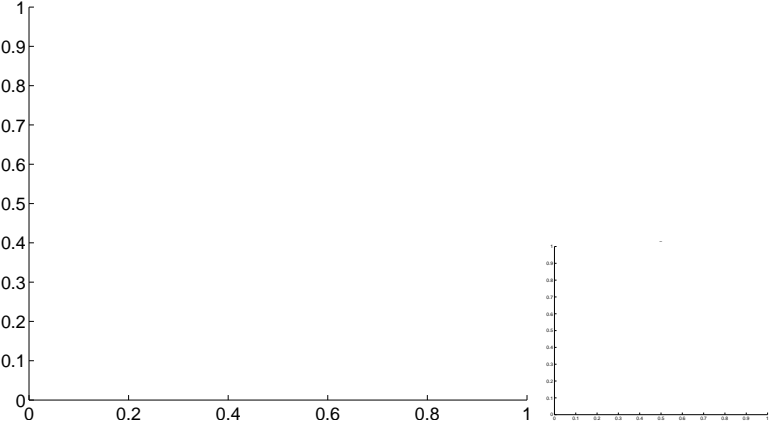
Q3 no OOT image



Q4 no difference image

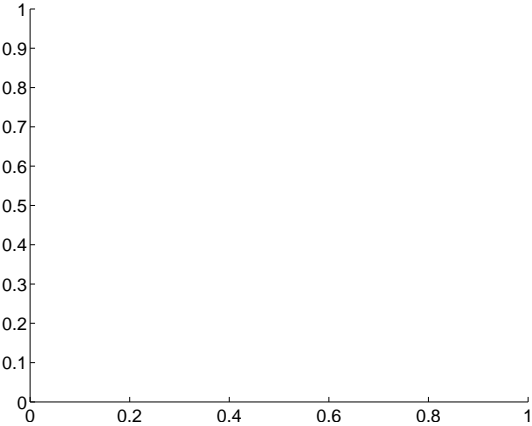


Q4 no OOT image

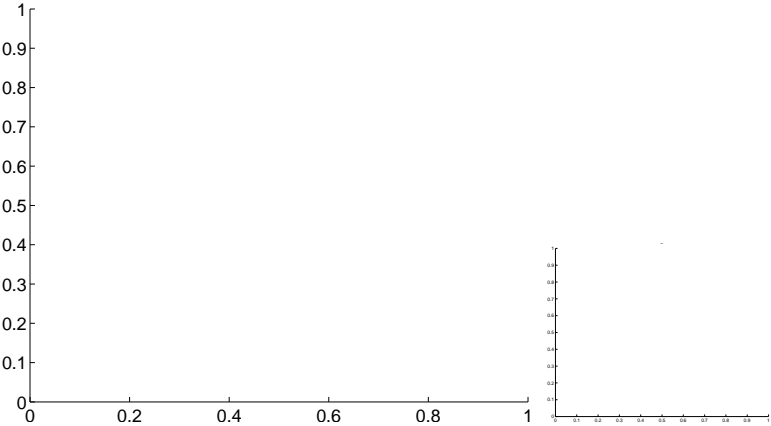


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

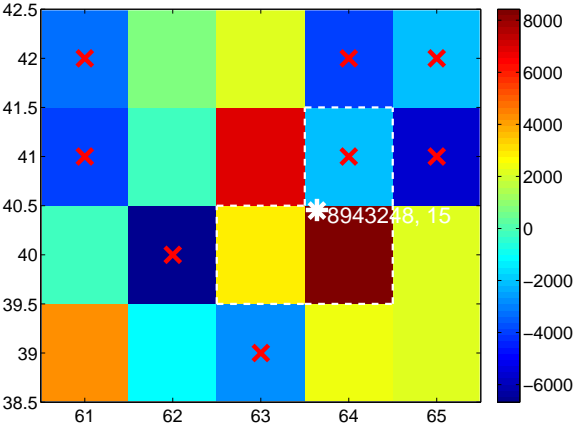
Q5 no difference image



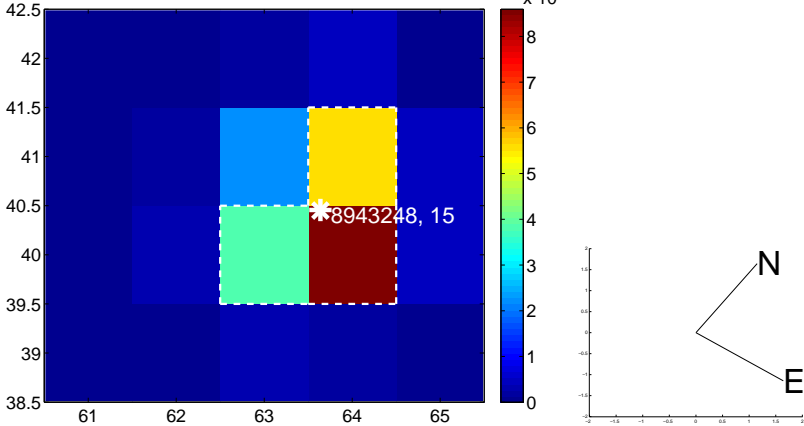
Q5 no OOT image



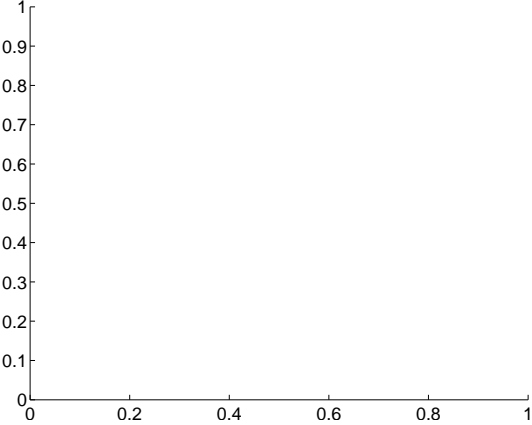
Q6 difference image. Poor Quality



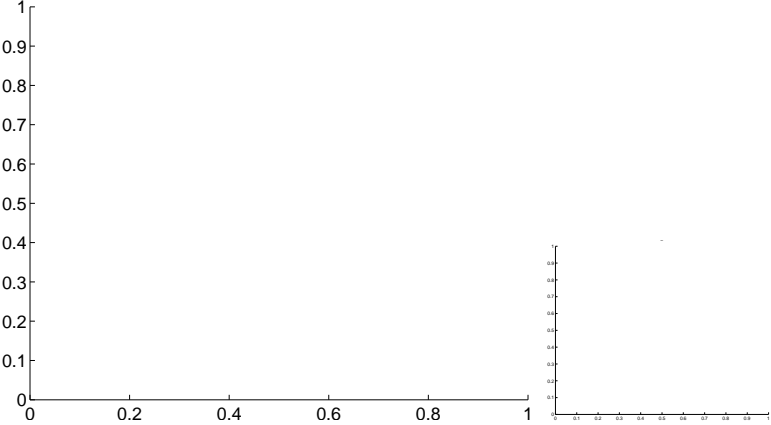
Q6 OOT image



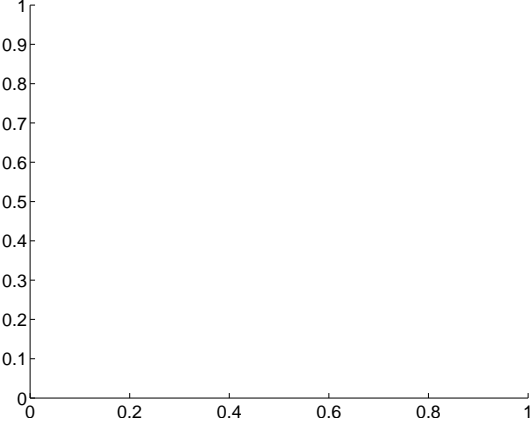
Q7 no difference image



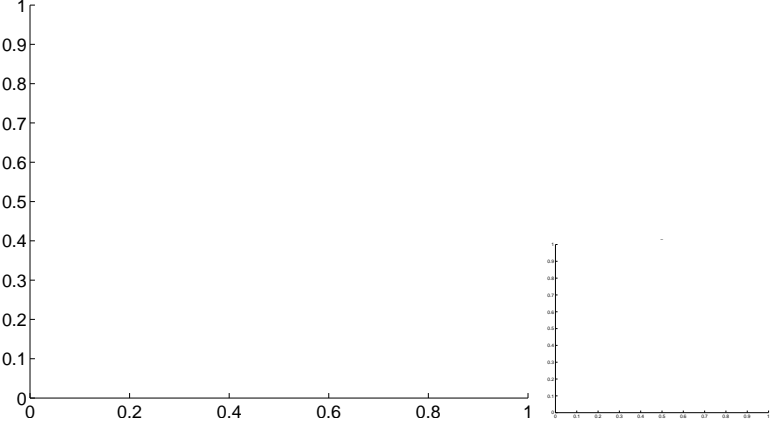
Q7 no OOT image



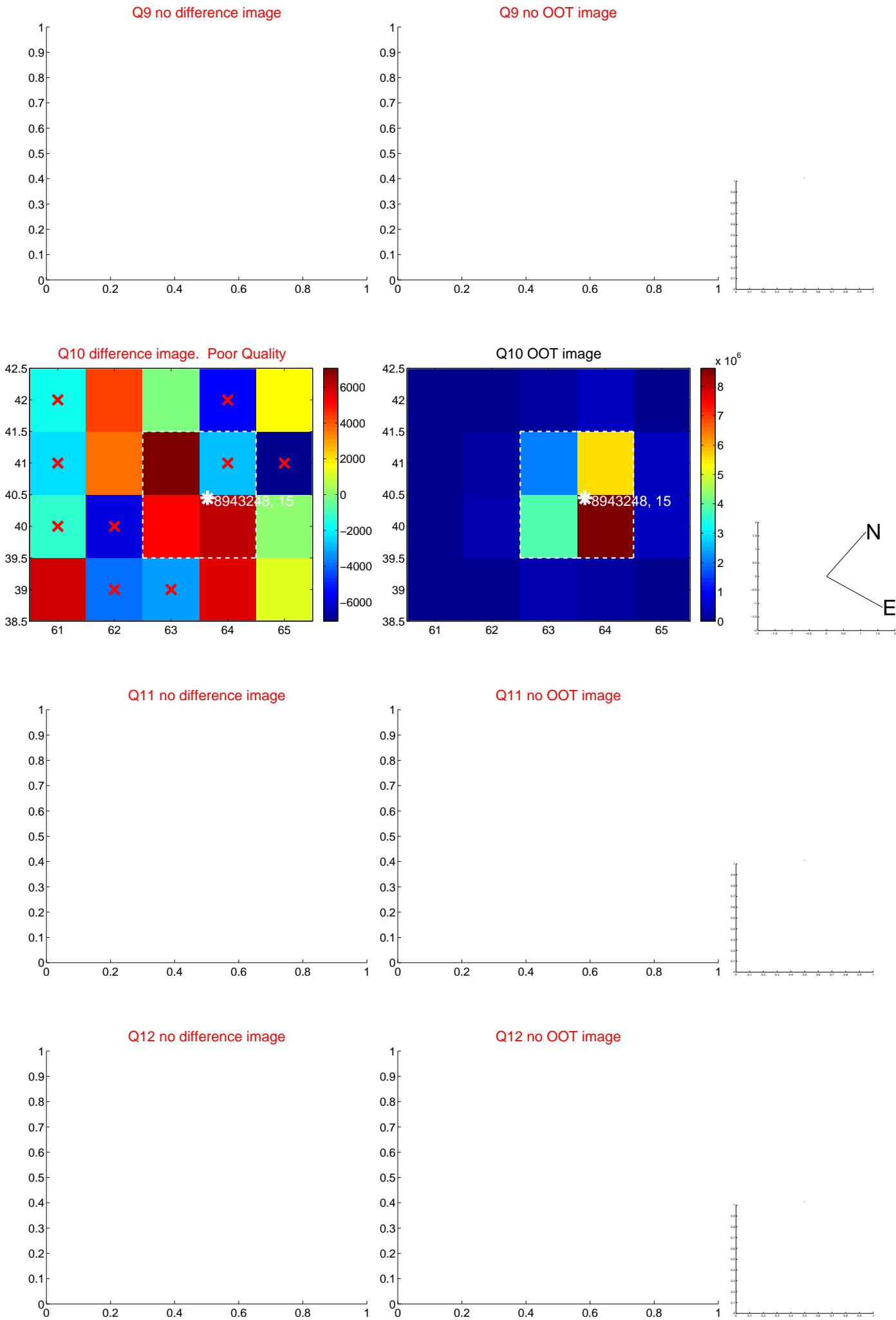
Q8 no difference image



Q8 no OOT image



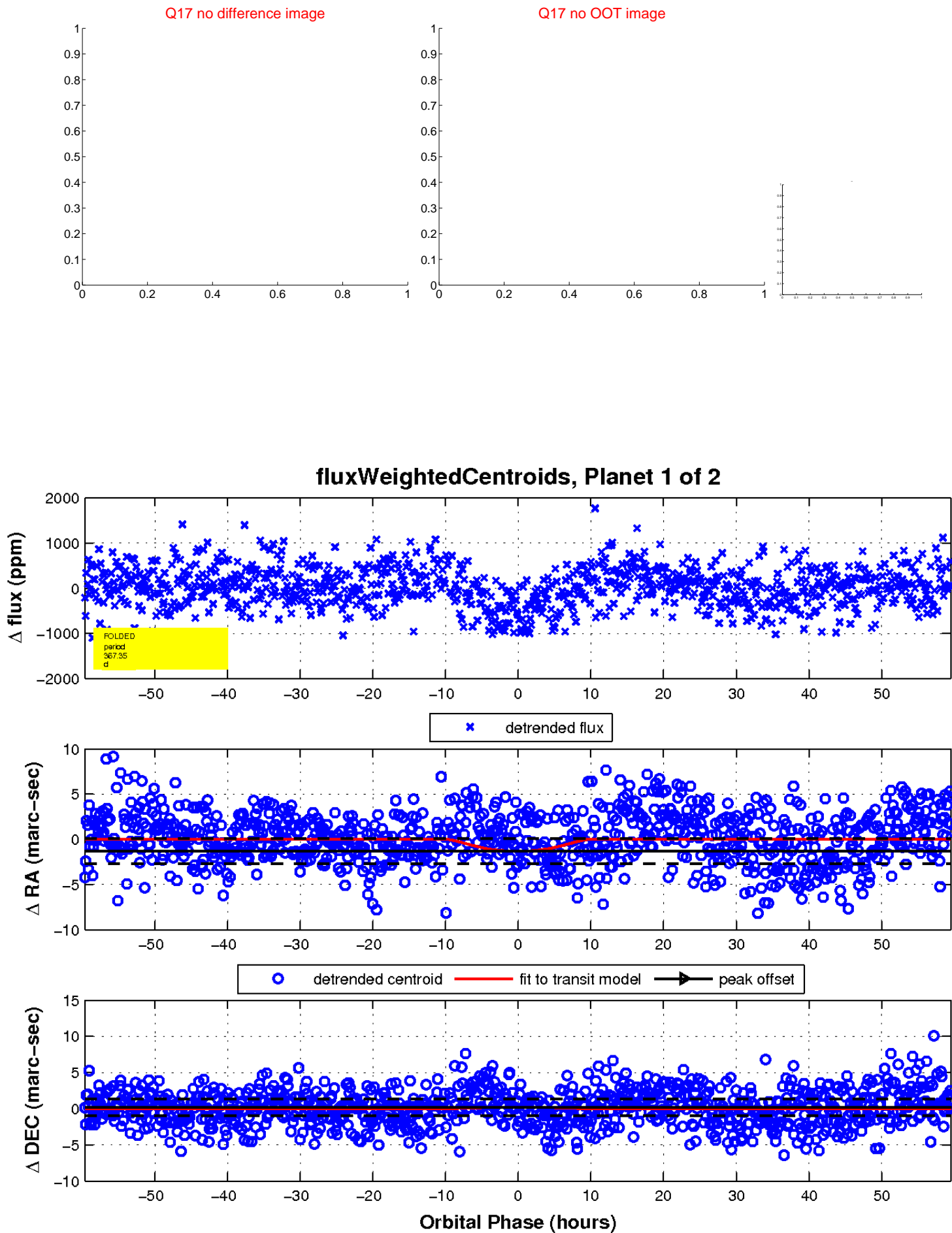
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

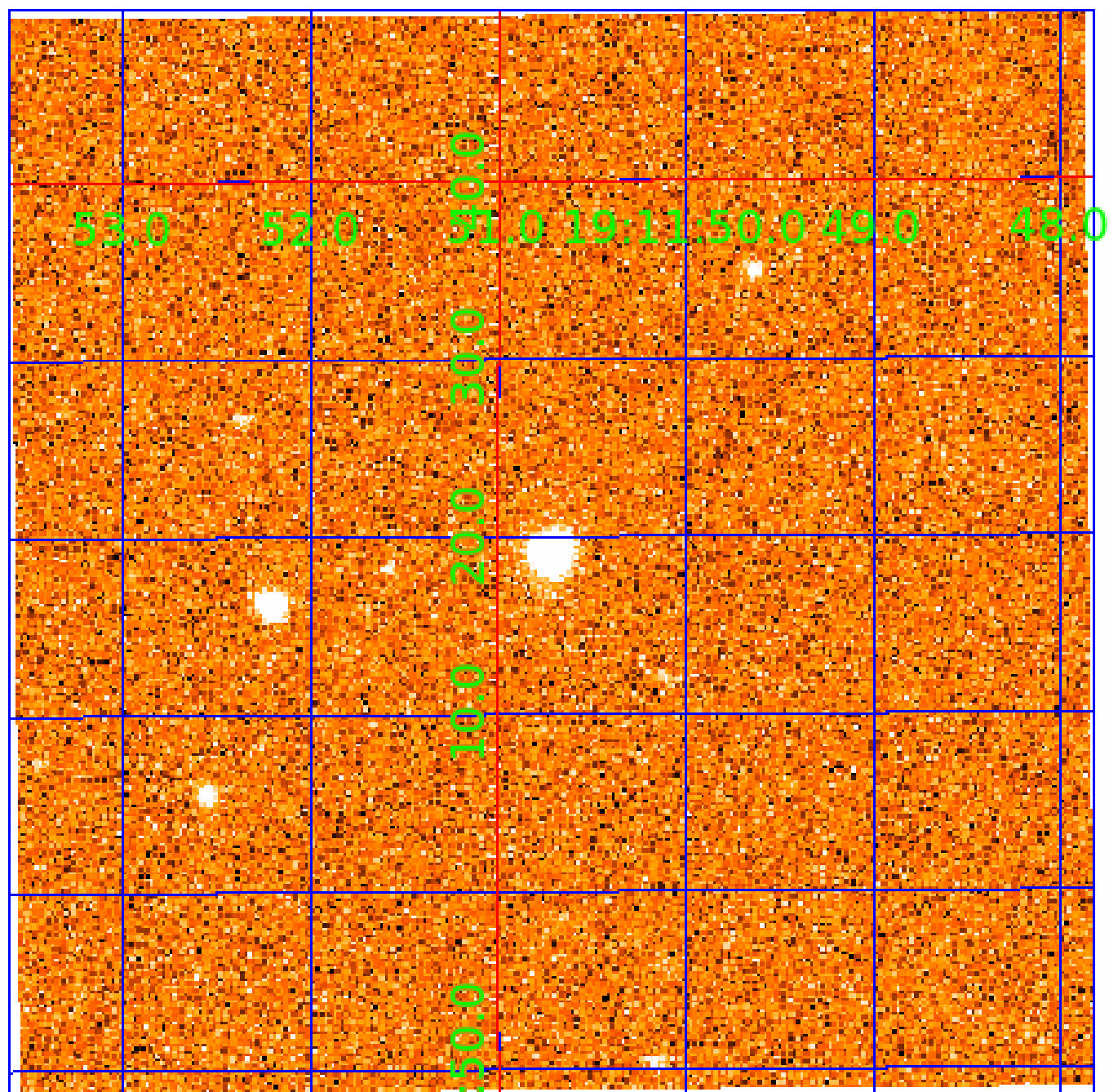


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 008943248

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008943248-01	OBS	No	367.346771	176.988189	577.9	19.883	8.1	8.0	1.50	5322	5.26	1.70
008943248-02	OBS	No	544.013120	193.422045	544.0	16.349	7.3	7.1	1.50	5322	3.73	1.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008943248-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—ALL_TRANS_CHASES—CENT_FEW_DIFFS
008943248-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—ALL_TRANS_CHASES—CENT_FEW_DIFFS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

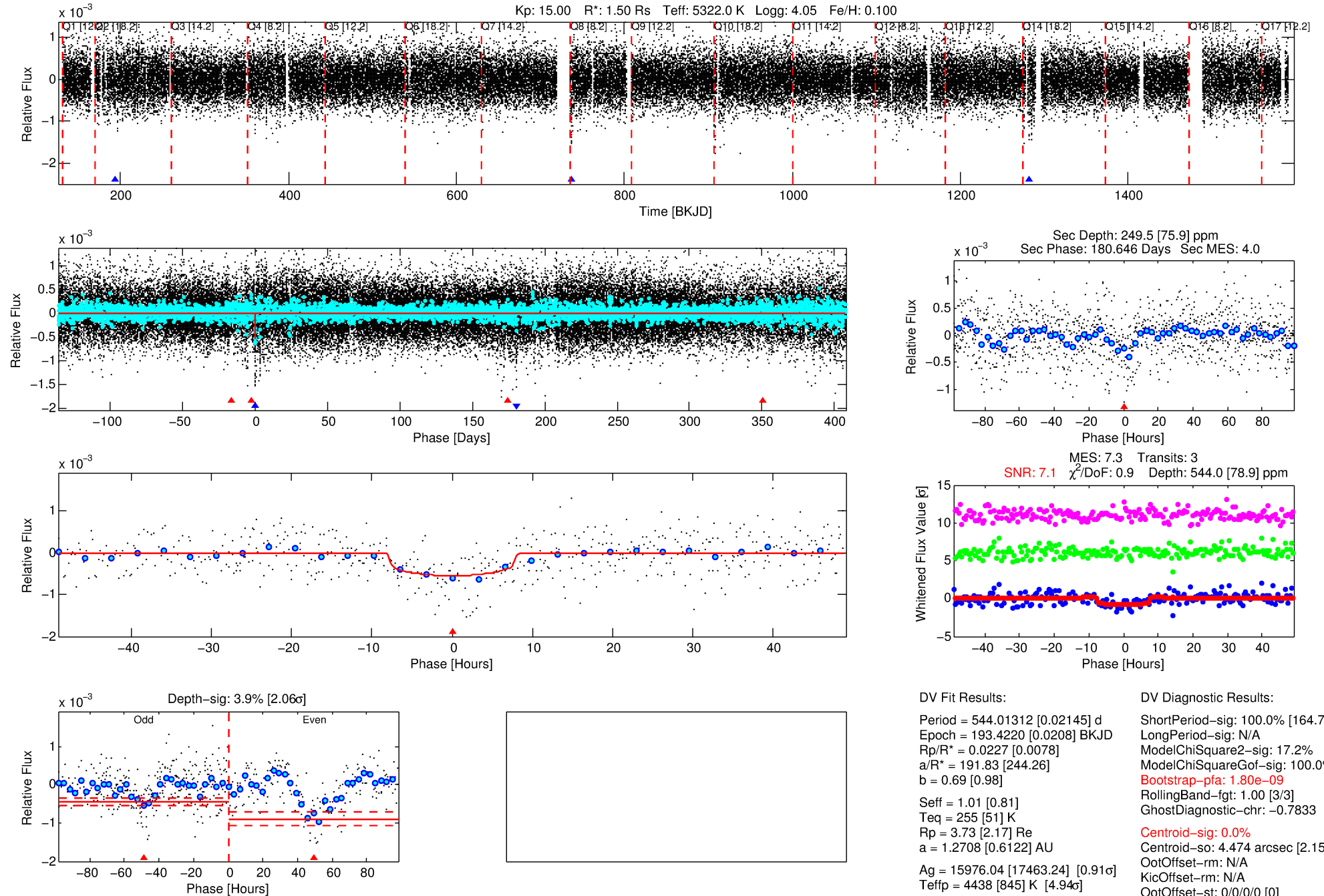
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008943248-02

No Significant Match Found

# DV One-Page Summary

KIC: 8943248 Candidate: 2 of 2 Period: 544.013 d



## DV Fit Results:

Period = 544.01312 [0.02145] d  
Epoch = 193.4220 [0.0208] BKJD  
Rp/R\* = 0.0227 [0.0078]  
a/R\* = 191.83 [244.26]  
b = 0.69 [0.98]  
Seff = 1.01 [0.81]  
Teq = 255 [51] K  
Rp = 3.73 [2.17] Re  
a = 1.2708 [0.6122] AU  
Ag = 15976.04 [17463.24] [0.91 $\sigma$ ]  
Teffp = 4438 [845] K [4.94 $\sigma$ ]

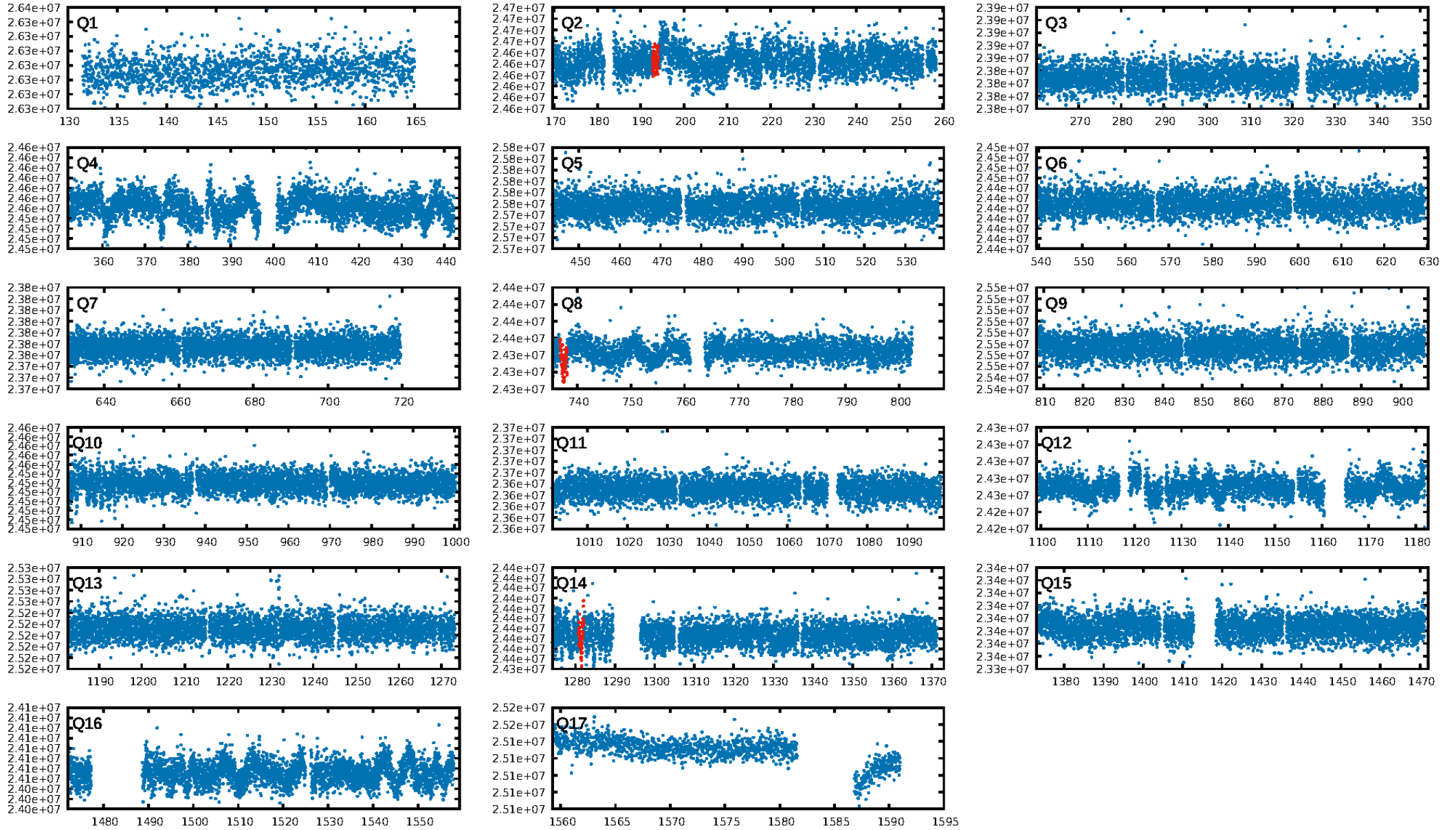
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [164.72 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 17.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.80e-09  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.7833  
Centroid-sig: 0.0%  
Centroid-so: 4.474 arcsec [2.15 $\sigma$ ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0 [0]  
KicOffset-st: 0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 1.00 [1/1]

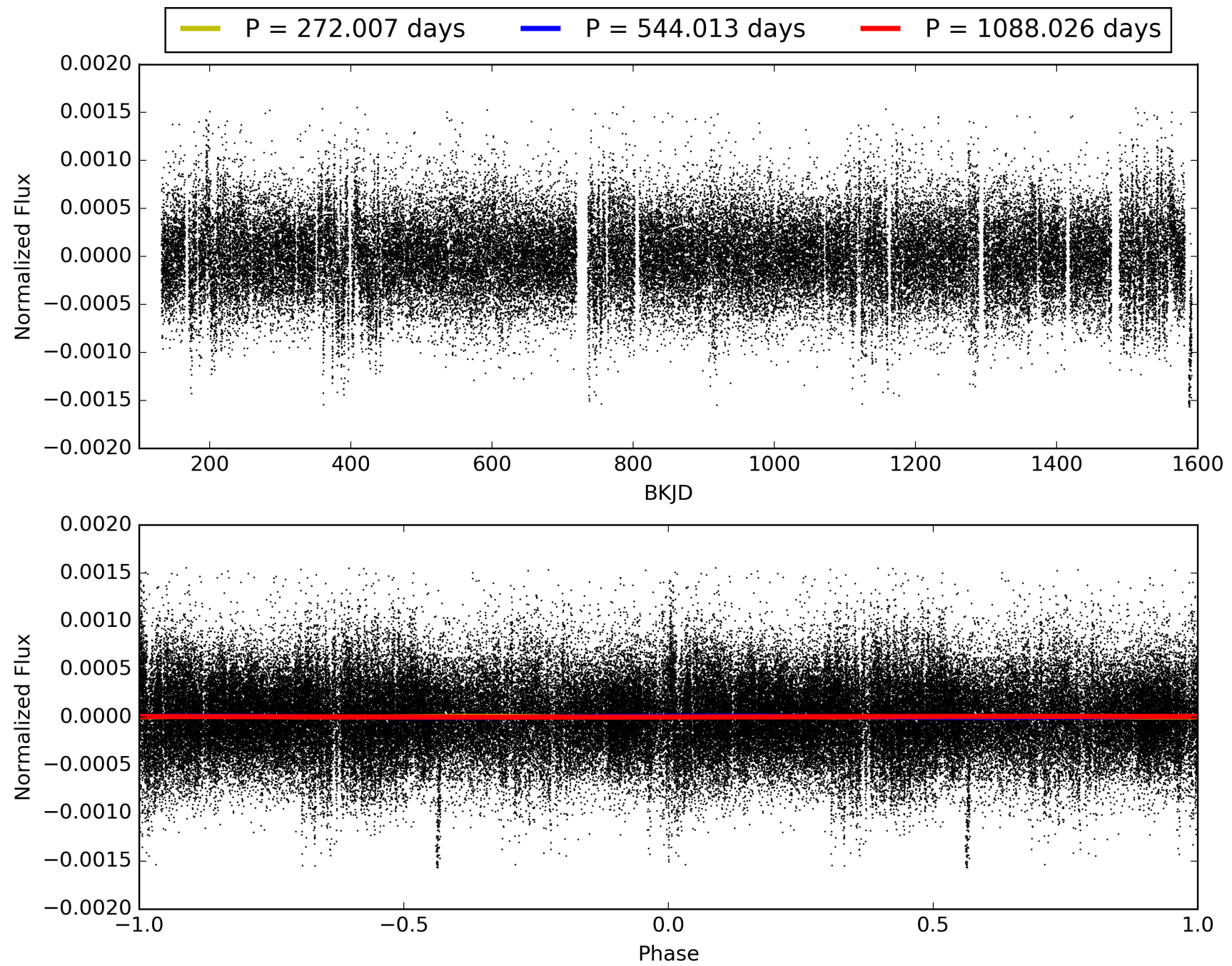
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 02:19:54 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008943248-02, PDC Light Curves

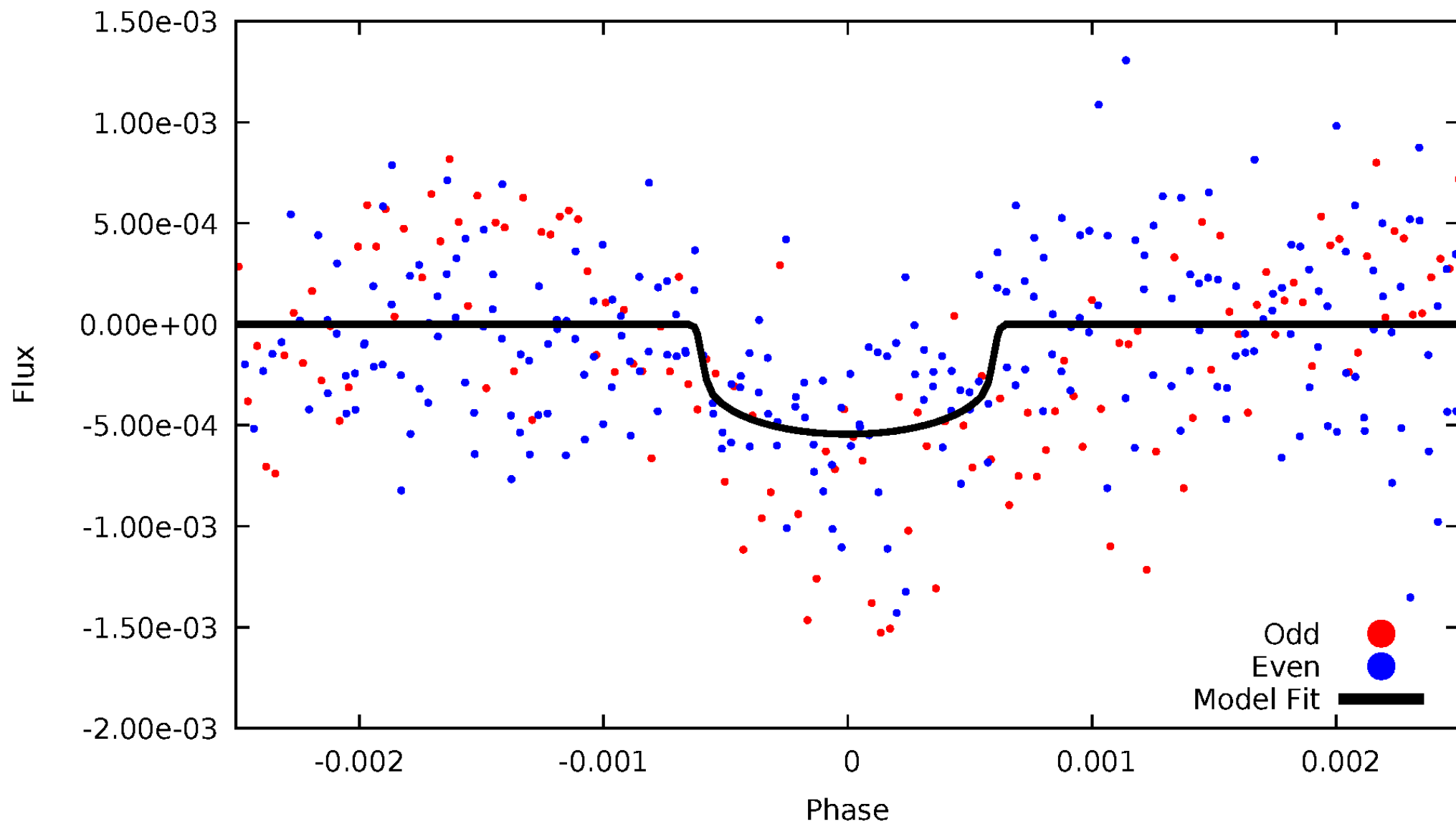


TCE 008943248-02



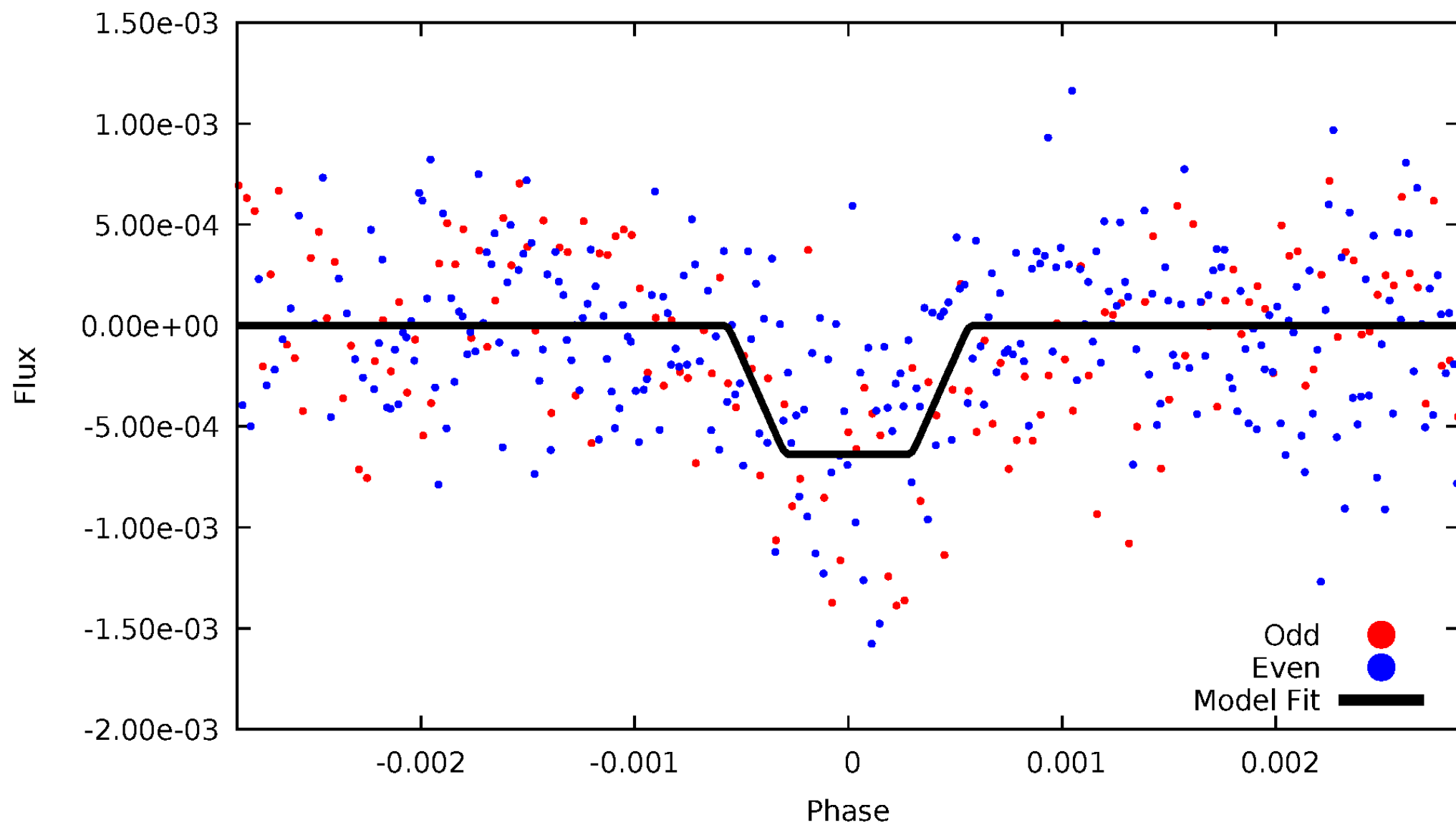
# DV Odd/Even

TCE 008943248-02



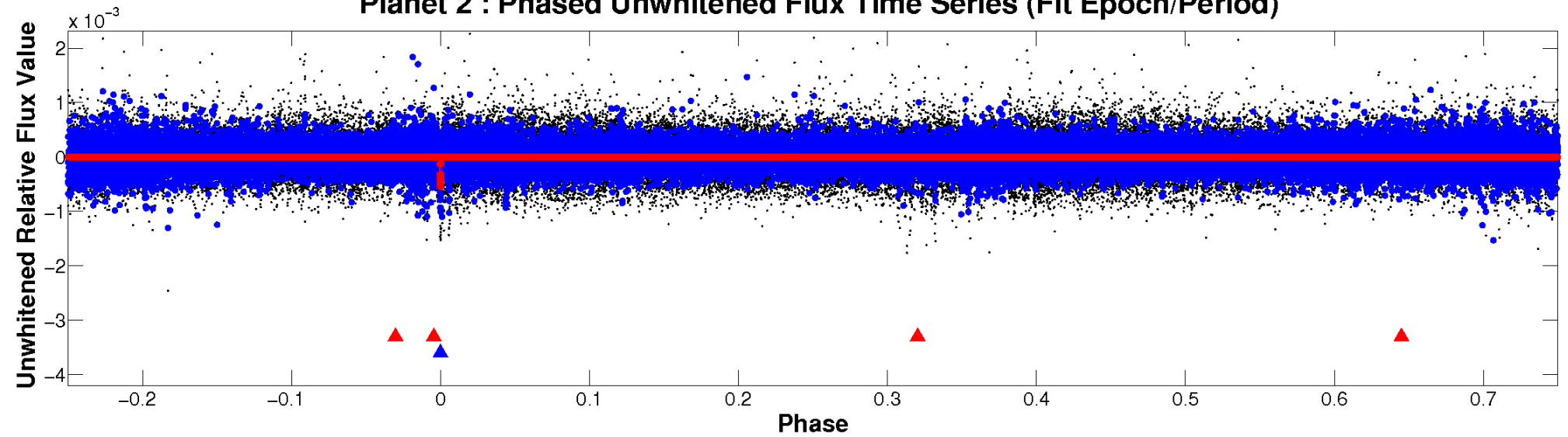
# ALT Odd/Even

TCE 008943248-02

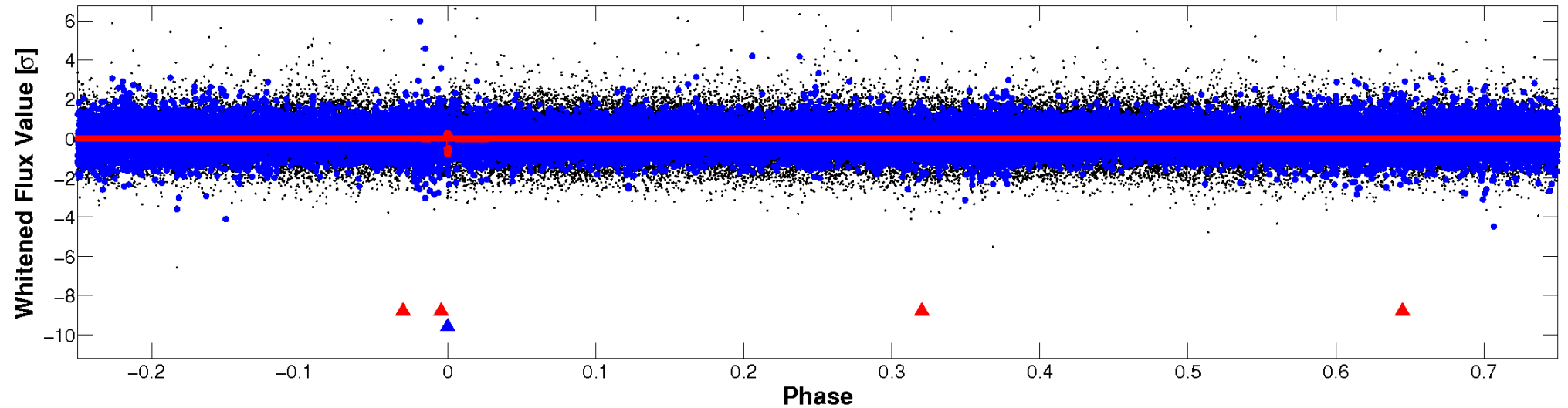


# Non-Whitened Vs. Whitened Light Curve

## Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



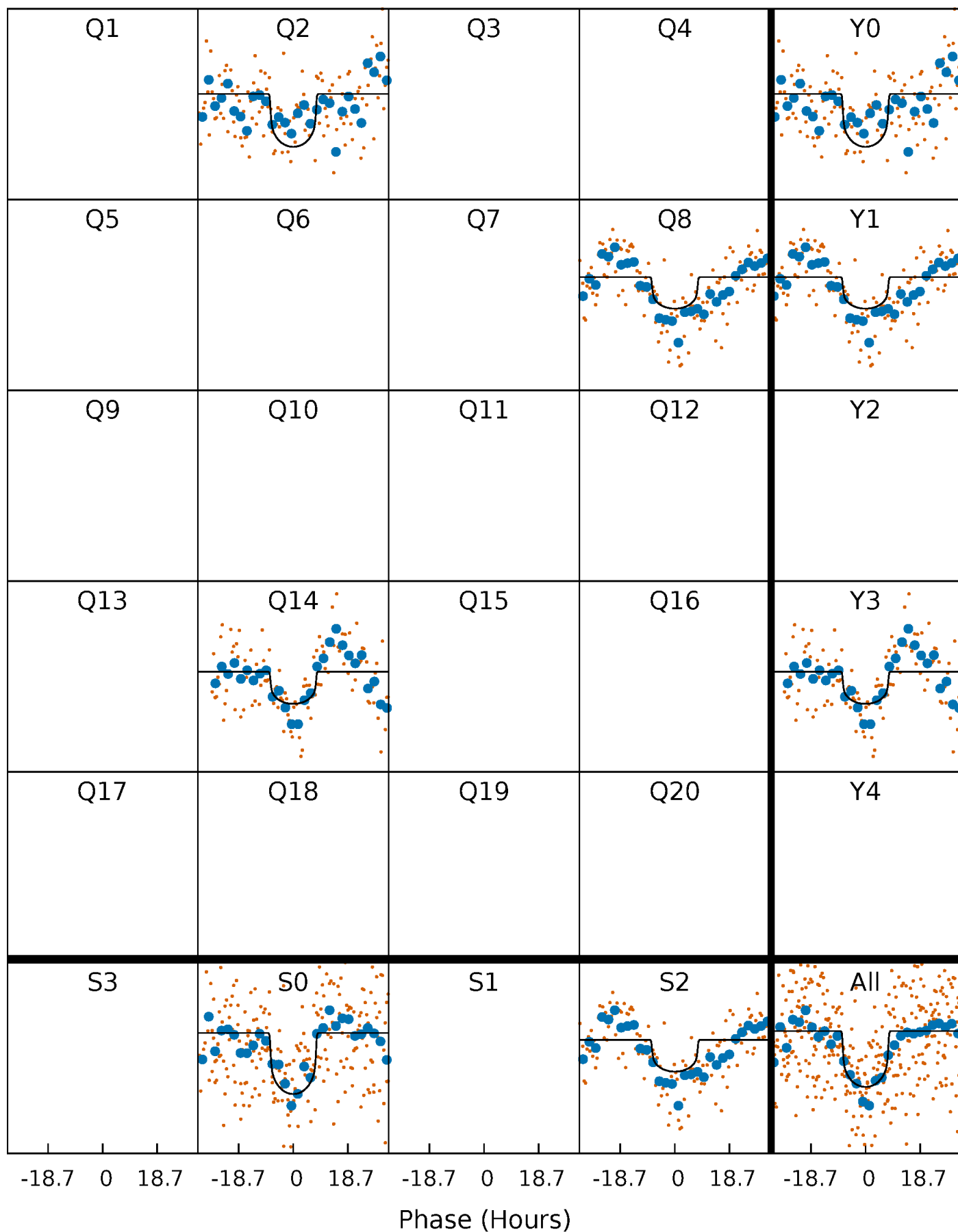
# PDC Quarter-Phased Transit Curves

TCE 008943248-02     $P=544.013120$  Days     $T_0=193.422045$  (BKJD)



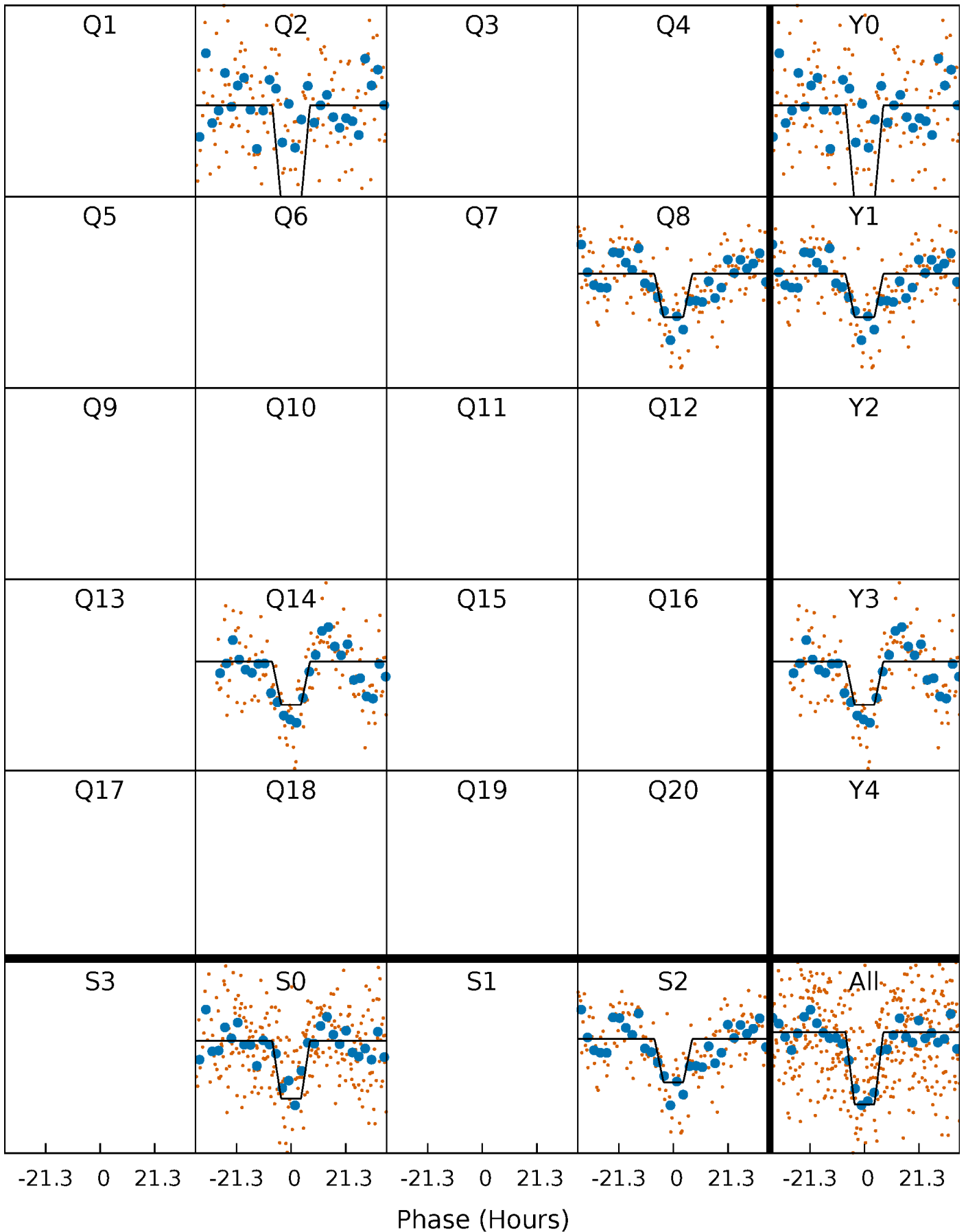
# DV Quarter-Phased Transit Curves

TCE 008943248-02 P=544.013120 Days  $T_0=193.422045$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

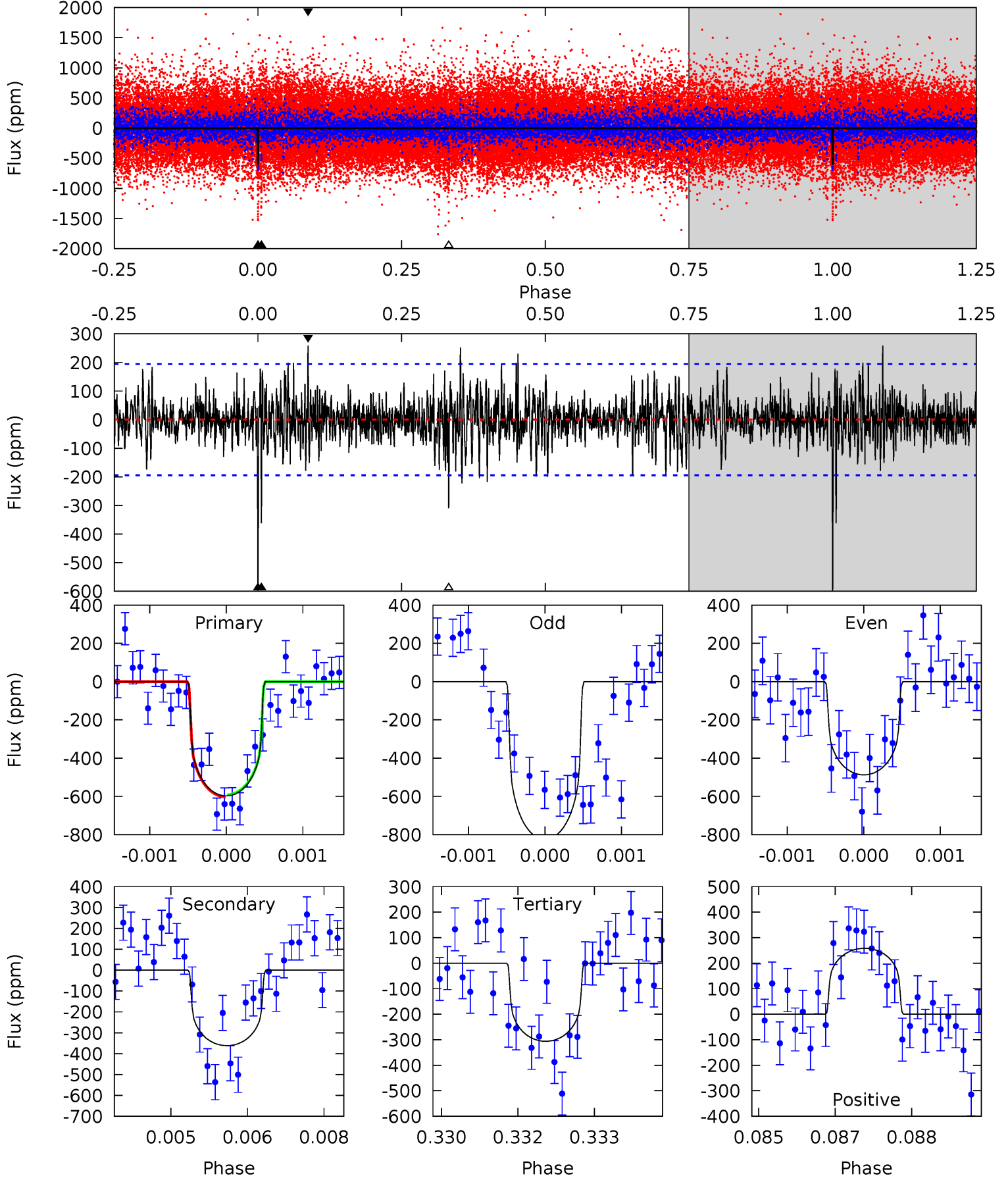
TCE 008943248-02 P=544.111647 Days  $T_0=193.274830$  (BKJD)



# DV Model-Shift Uniqueness Test

008943248-02, P = 544.013120 Days, E = 193.422045 Days

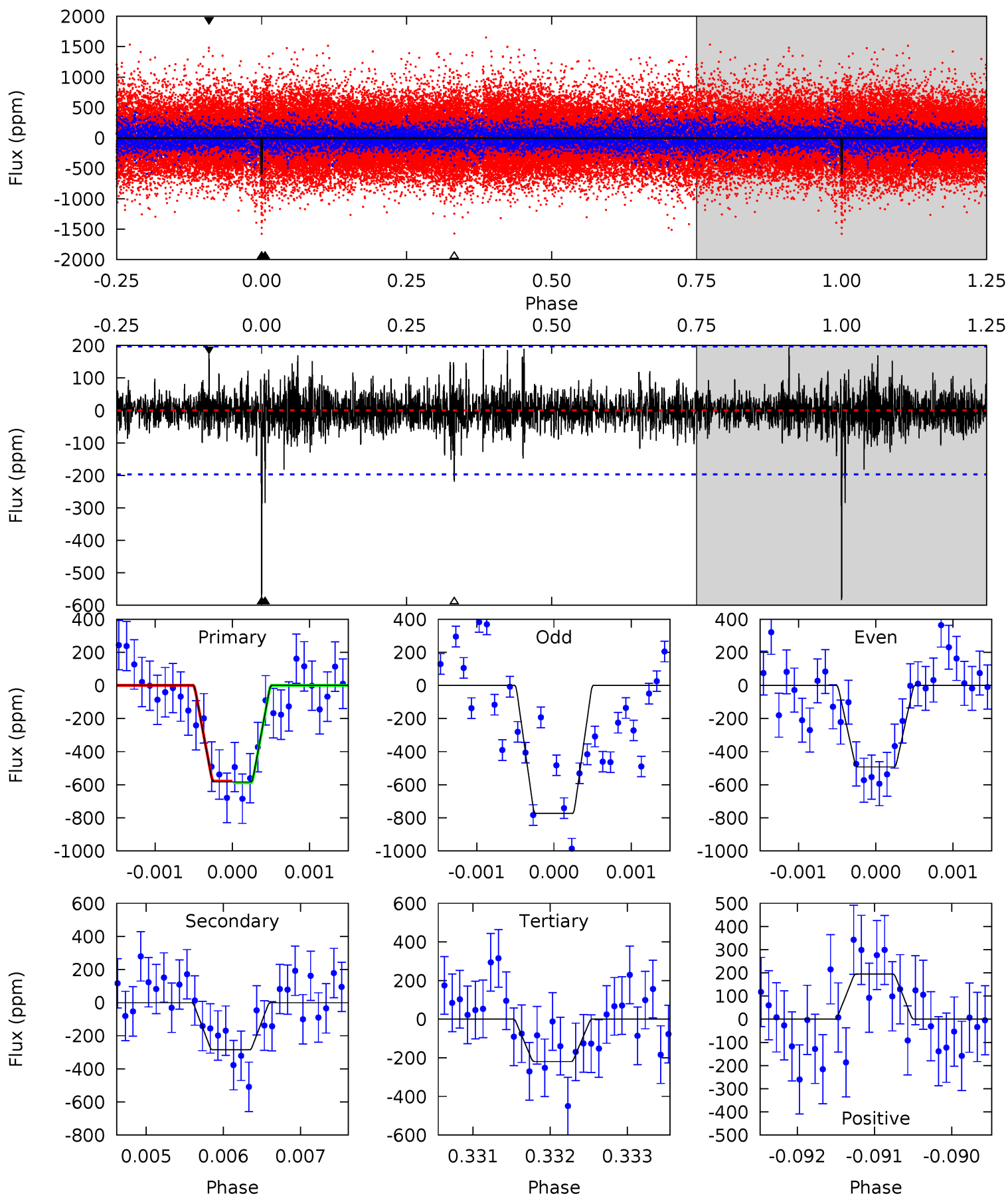
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.6	10.1	8.53	7.19	5.41	3.22	1.67	8.11	9.44	1.55	2.88	4.47	0.92	0.30	0.15



# Alt Model-Shift Uniqueness Test

008943248-02, P = 544.111647 Days, E = 193.274830 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.1	7.86	6.04	5.36	5.43	3.25	1.15	10.0	10.7	1.81	2.50	3.66	0.76	0.25	0.14



### Stellar Parameters For KIC 008943248

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5322^{+175}_{-159}$	$4.050^{+0.476}_{-0.204}$	$0.100^{+0.250}_{-0.250}$	$1.503^{+0.531}_{-0.708}$	$0.923^{+0.073}_{-0.100}$	$0.383^{+1.594}_{-0.210}$
	+3%/-3%	+12%/-5%	+250%/-250%	+35%/-47%	+8%/-11%	+416%/-55%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 008943248-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-362 \pm 36$	$3.54^{+1.49}_{-1.31}$	$354^{+35}_{-44}$	$4915^{+1001}_{-572}$	$25105^{+42105}_{-12676}$
Alt.	$-285 \pm 36$	$4.10^{+1.50}_{-1.54}$	$356^{+33}_{-44}$	$4469^{+734}_{-451}$	$14980^{+23755}_{-7080}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

## DV Centroid Data

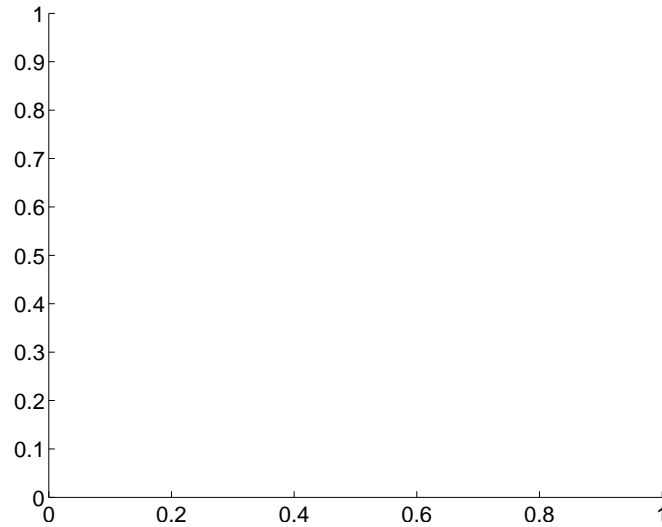
Supplemental centroid analysis for 008943248-02. Kepler magnitude: 15.00. Transit SNR 7.06

There are 0 quarters with good PRF difference image offsets

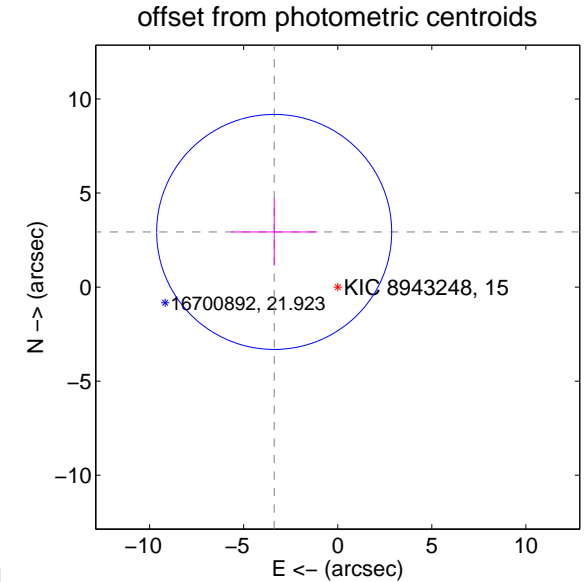
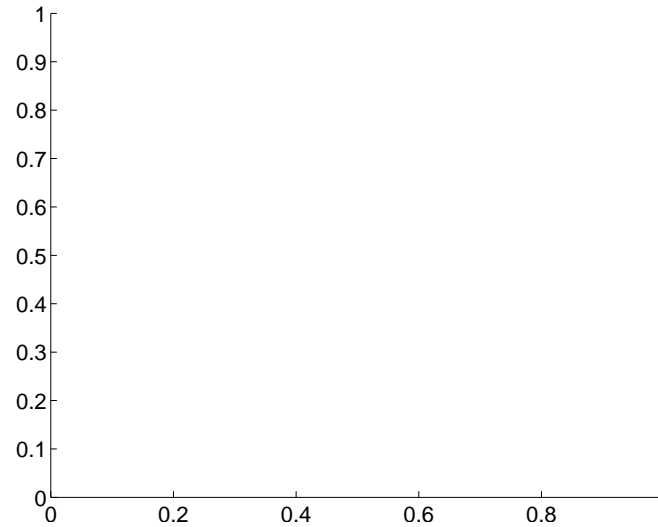
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$4.47 \pm 2.08$	2.15	$3.38 \pm 2.29$	$2.93 \pm 1.77$

There is no PRF-fit offset from OOT-fit

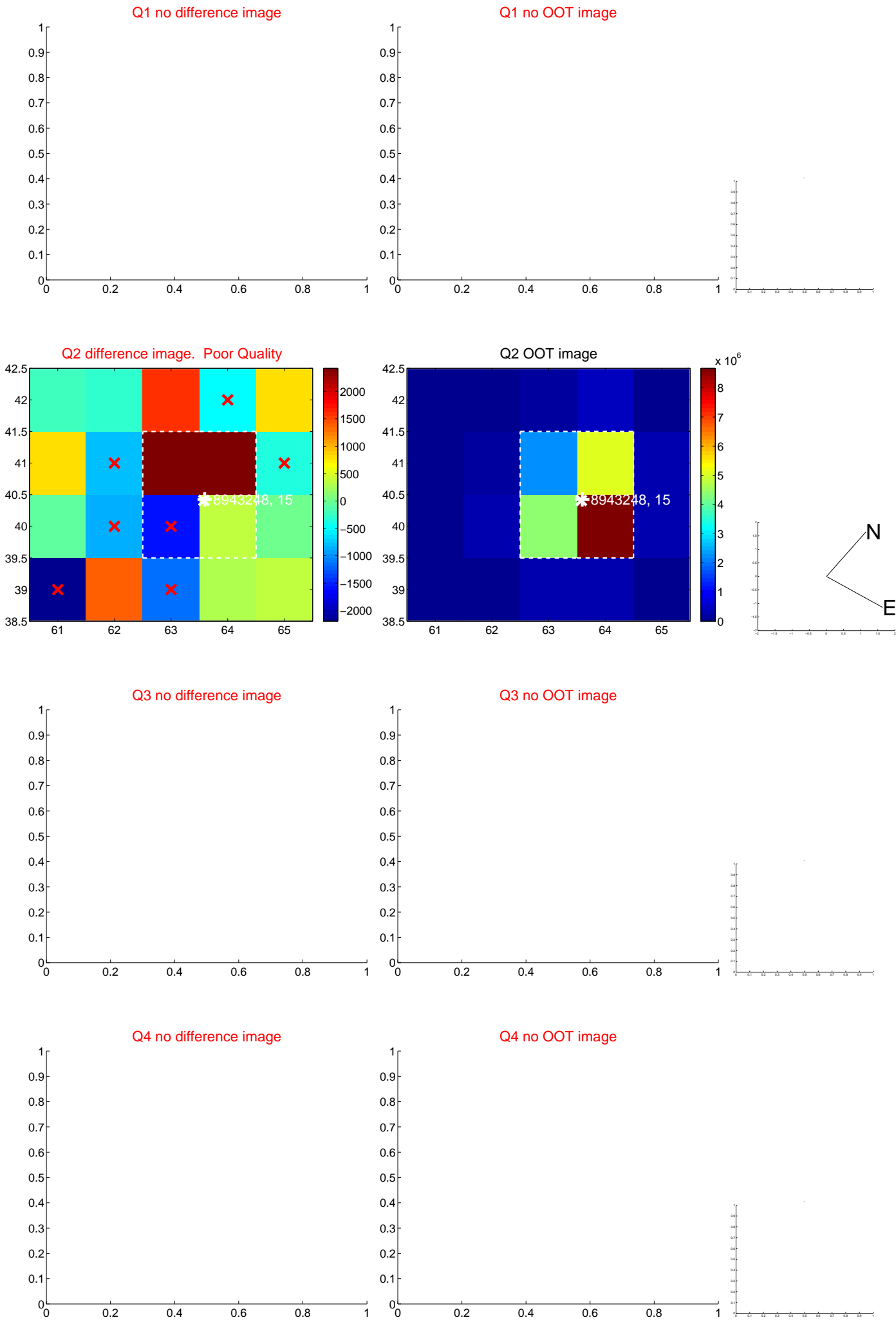


There is no PRF-fit offset from KIC

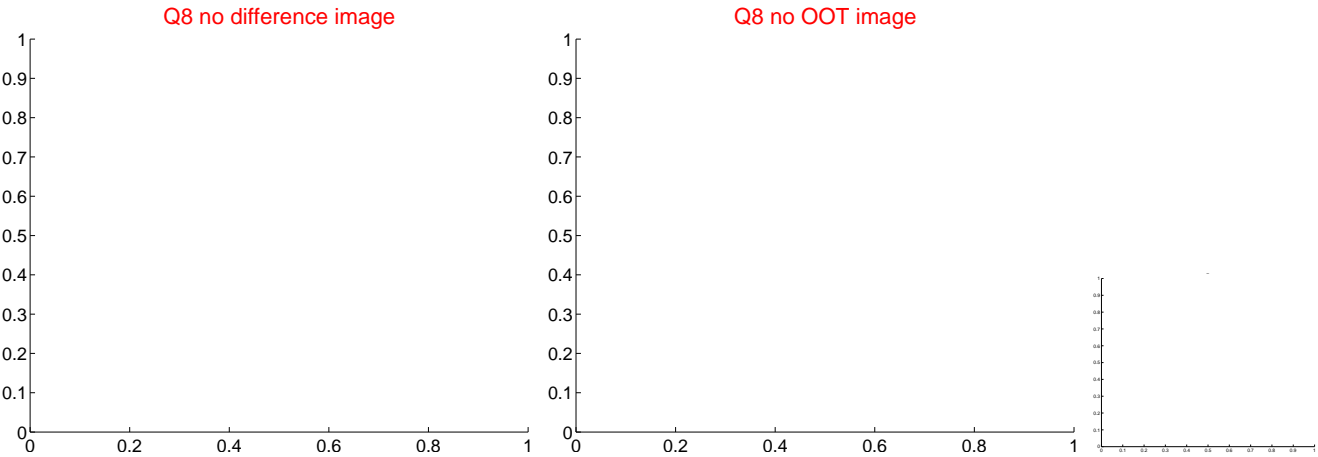
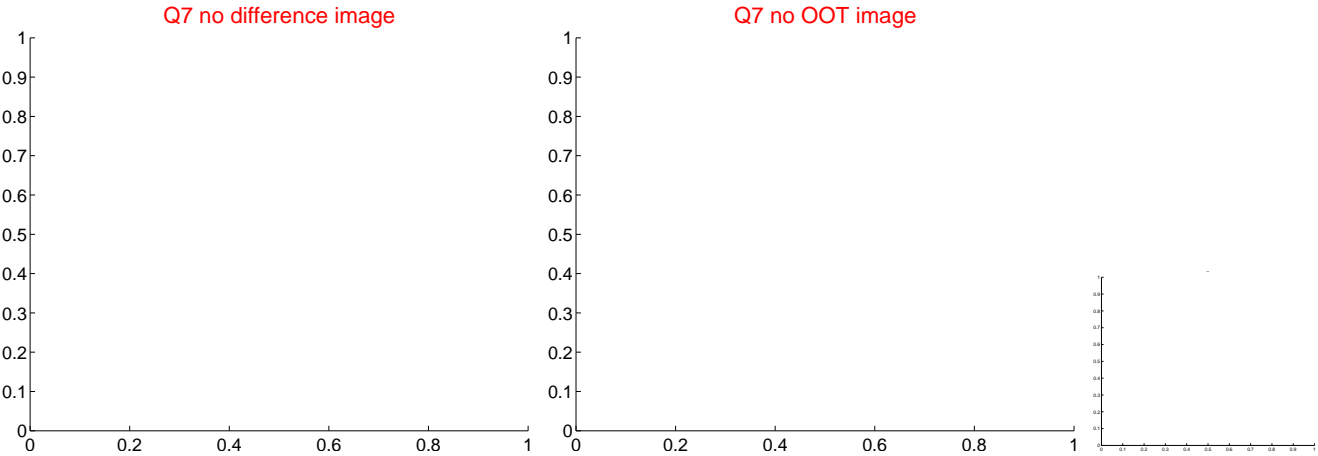
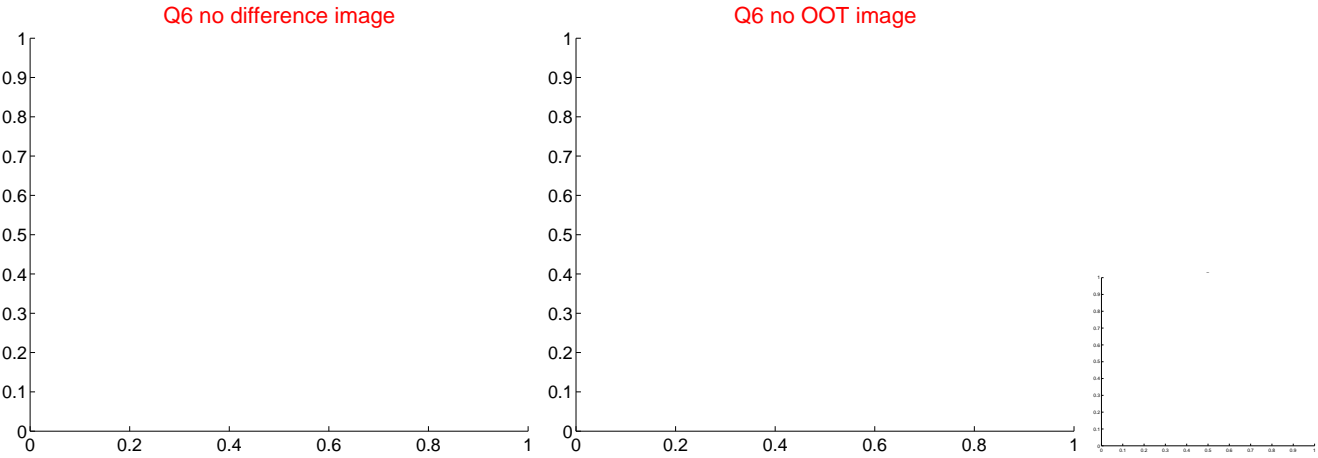
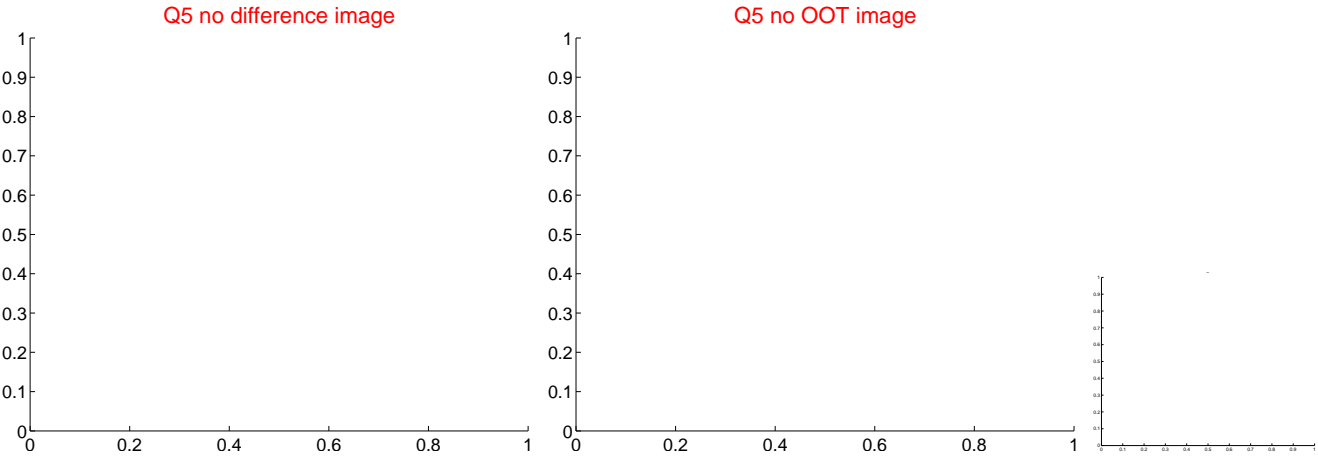


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

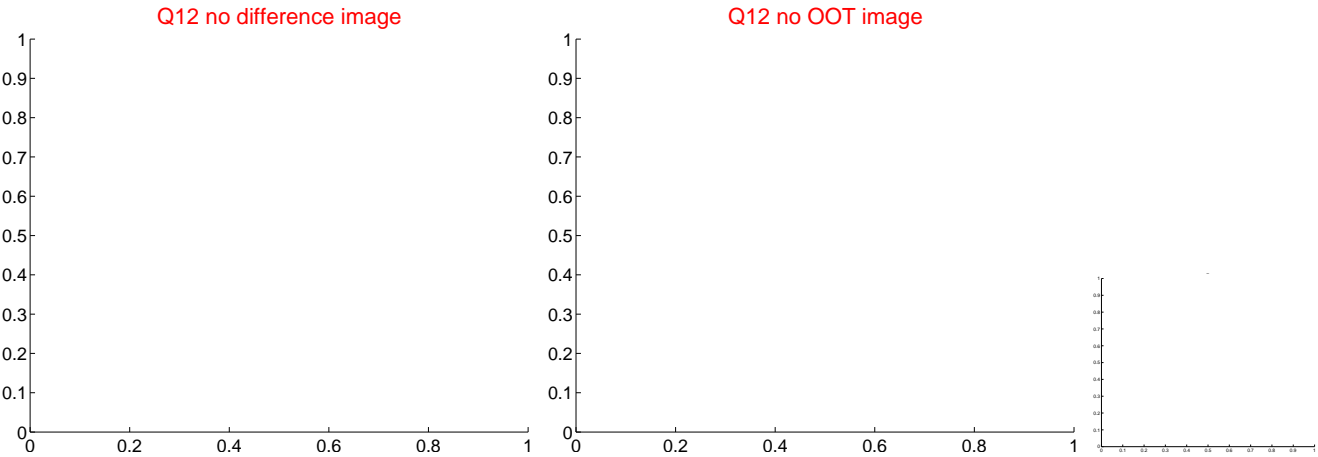
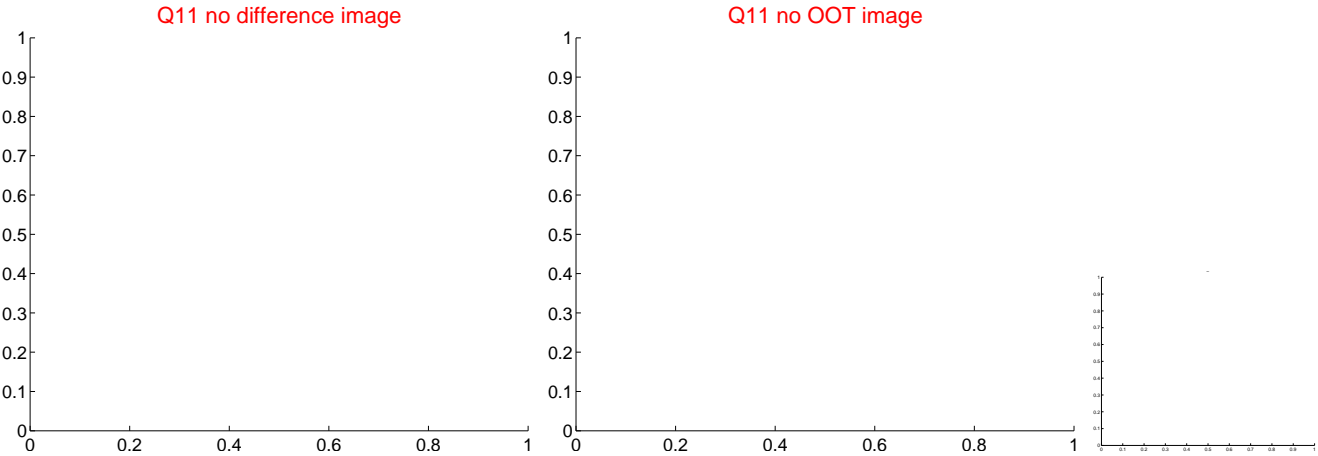
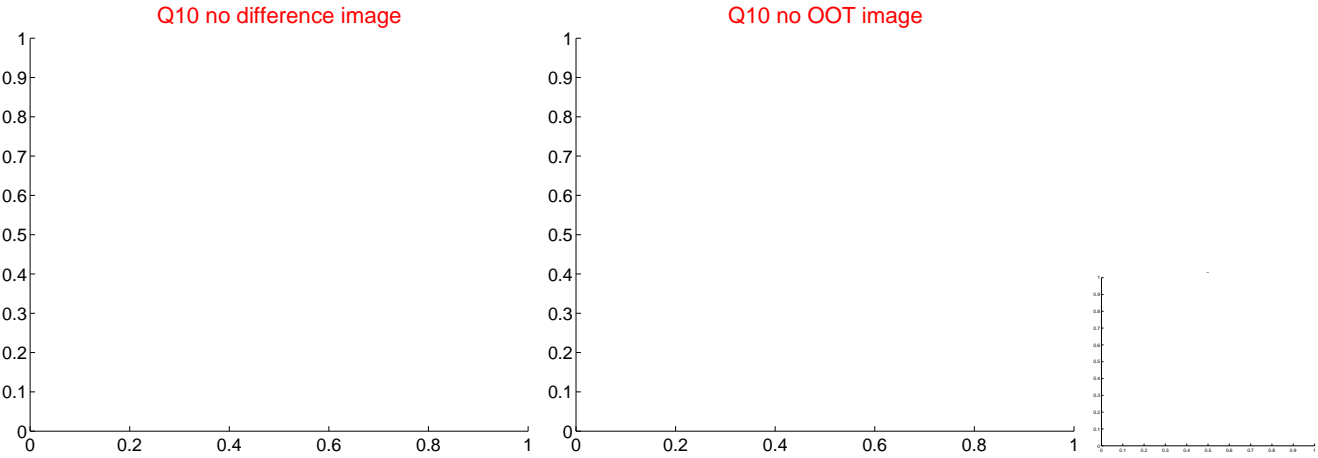
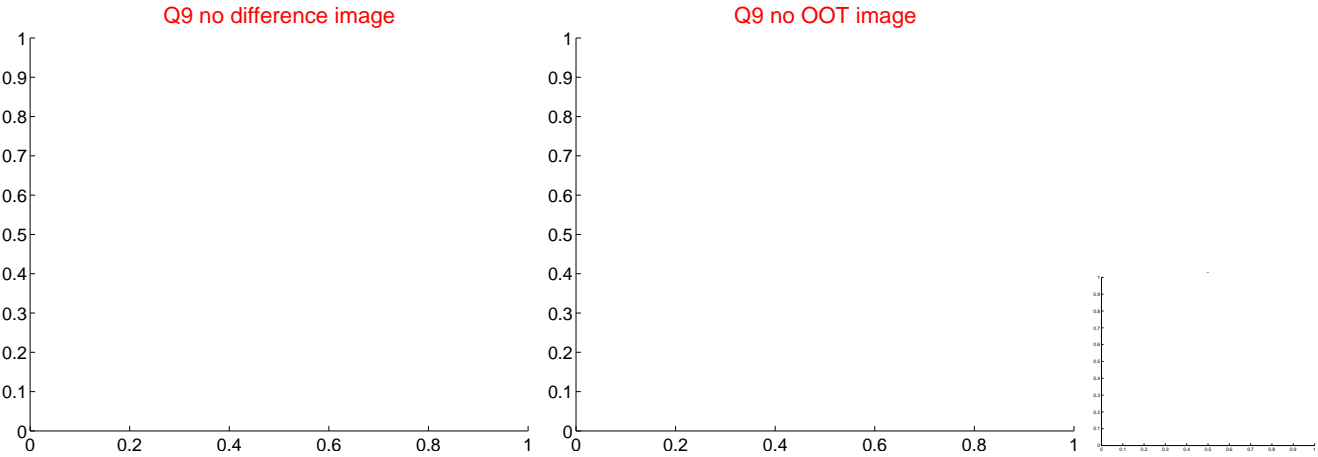
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



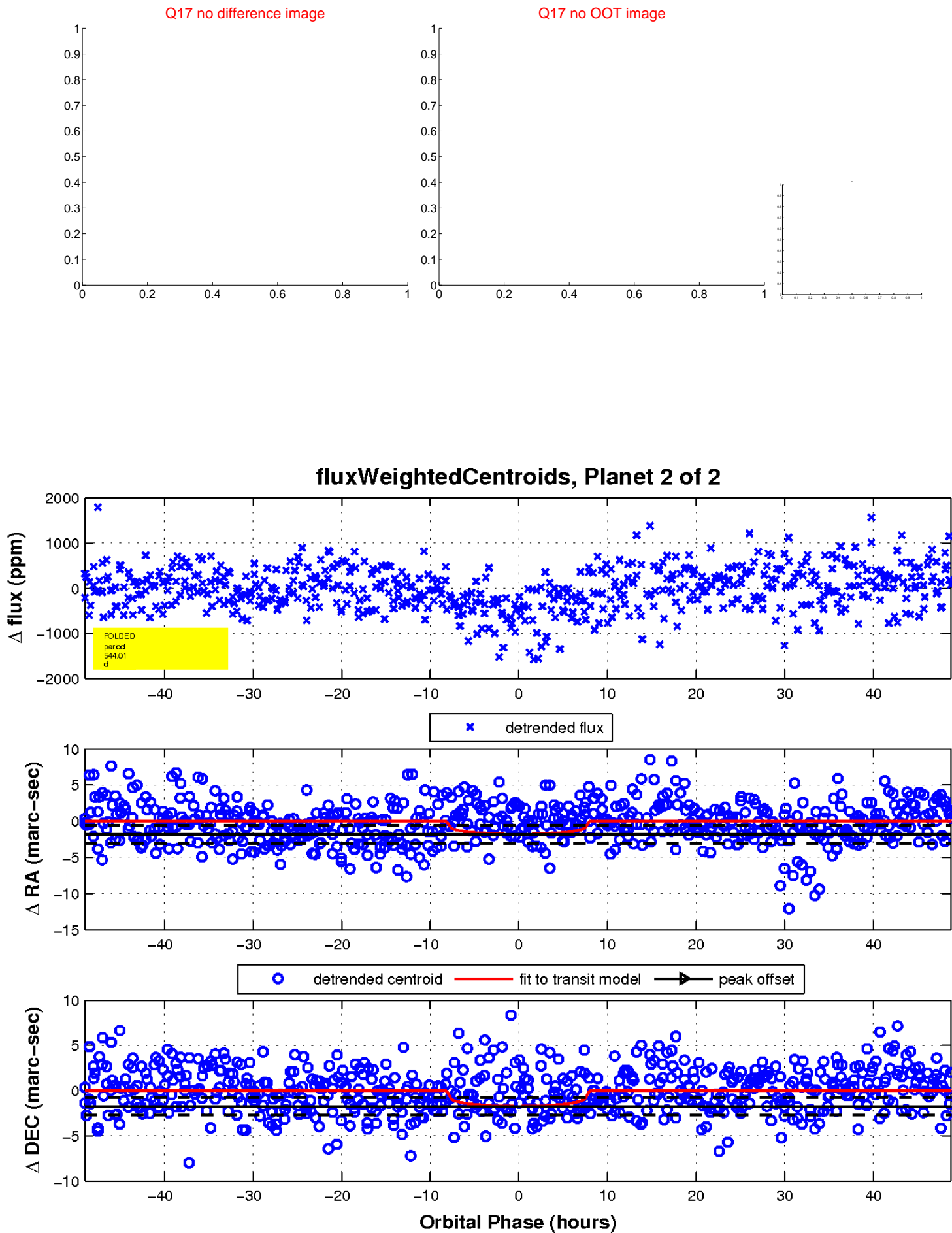
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination

